



## Application/Selection Guide

Cole-Parmer offers a wide variety of flowmeters and flow controllers for any application. For special or unique applications, use the helpful "Application Parameter" table at right to narrow your selection.



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Application Parameter	Gases	Liquids	Flowmeter type	Page(s)			
Low-flow measurement/control (some types as low as 1 sccm air and 0.1 mL/min water, max of range)	•	•	Gas Mass	624-632			
			Differential pressure	633-634			
			Indicators/switches	622-623, 663-664			
			Turbine	640			
			Variable area	593-621			
			Pelton Wheel	635-638			
			Vortex	662			
			Gear	652			
			Paddle wheel	646-651			
			Magnetic	658-661			
			Ultrasonic	653-656			
			High-flow measurement/control (some types as high as 2300 scfm gas and 2600 GPM liquid)	•	•	Gas Mass	624-629, 631-632
						Differential pressure	633-634
Indicators/switches	622-623, 663-664						
Variable area	593-621						
Pelton Wheel	635-638						
Vortex	662						
Paddle wheel	646-651						
Magnetic	658-661						
Turbine	640						
Ultrasonic	653-656						
High pressure (500 psi and above)	•	•				Gas Mass	627-630, 632
						Switches	664
						Variable area	602
			Gear	652			
			Turbine	642-644			
			Ultrasonic	653-656			
High temperature (200°F and above)	•	•	Differential pressure	633-634			
			Variable area	601-607, 609, 614-615, 616-617			
			Ultrasonic	653, 655-656			
			Turbine	643			
			Magnetic	658, 660			
			Paddle wheel	646-648, 650			
			Gear	652			
			High-accuracy measurement (error at or below 1%)	•	•	Differential pressure	633-634
Pelton Wheel	635-638						
Gas Mass	624-632						
Gear	652						
Paddle wheel	646-650						
Magnetic	658-661						
Turbine	640-644						
Ultrasonic	653, 655-656						
Aggressive or pure fluids	•	•	Gas Mass	627-630			
			Turbine	639-645			
			Switches	663-664			
			Variable area	604-605, 608-610, 618-620			
			Gear	652			
			Paddle wheel	650-651			
			Magnetic (aggressive only)	658-661			
			Ultrasonic	653-656			
Liquids with heavy particulates or slurries	•	•	Magnetic	658-661			
			Ultrasonic	654-656			
High-viscosity fluids	•	•	Gear	652			
			Magnetic	654-656			
No wired power available	•	•	Differential pressure	633-634			
			Sight flow indicators	622-623			
			Turbine	641-645			
			Variable area	593-621			
			Gear	652			
			Paddle wheel	650-651			
			Ultrasonic	654			
			Intrinsically safe	•	•	Variable area	593-621
Turbine	641-642, 644						
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			Magnetic	659-661			
			Paddle wheel	646-648			
Sanitary (meets 3A standards)	•	•	Turbine	642-643			
			Magnetic	661			

KEY INFORMATION



**Flowmeters**  
Introduction

KEY INFORMATION

**Application/Selection Guide**

**Flowmeter Parameter Guide**

Flowmeter Type	Best Accuracy	Media Type		Gas Flow Rate	Liquid Flow Rate	Viscosity	Max Pressure	Analog Output	Serial Communication	Pages
		Liquid	Gases							
Variable Area	±2% FS	Yes	Yes	0.1mL/min to 2200 LPM	0.002mL/min to 500 LPM	Water-like only	Typically 200 psig (varies)	Alarm units only	No	593-621
Gas Mass	±0.2% FS	No	Yes	0.01mL/min to 1000 LPM	—	—	Maximum 100 psig	Yes	Yes	624-632
Differential Pressure	±1% FS	Yes	Yes	0.02mL/min to 500 LPM	0 to 10 LPM	Water-like only	Maximum 100 psig	Yes	Yes	633-634
Pelton Wheel	±0.5% FS	Yes	Yes	20mL/min to 500 LPM	13mL/min to 10 LPM	Water-like only	Maximum 500 psig	Yes	Yes	635-638
Turbine	±0.5% of reading	Yes	No	—	0.11 to 17,791 LPM	Water-like only	Maximum 5000 psig	Yes	No	639-645
Paddle Wheel	±1% FS	Yes	No	—	0.03 to 26,411 LPM	Water-like only	Maximum 1500 psig	Yes	No	646-651
Gear	±0.5% of reading	Yes	No	—	0.01 to 227 LPM	Up to 100,000 cps	Maximum 5000 psig	Yes	No	652
Ultrasonic	±0.5% of reading	Yes	No	—	Varies w/ pipe size	Slurries	Varies w/type	Yes	Yes	653-656
Magnetic	≤0.3% of flow rate	Yes	No	—	0.38 to 22,620 LPM	Slurries	Maximum 259 psig	Yes	Yes	658-661
Vortex	±0.75% of flow rate	Yes	Yes	84 to 8228 LPM	Varies w/density	Up to 7.5cps	275 psig	Yes	Yes	662

**Why Cole-Parmer should be your source for flowmeters**

For more than 50 years, Cole-Parmer® has delivered solutions to our customers. With an unparalleled depth and breadth of flowmeter technologies, Cole-Parmer also has a solution to meet your needs. Our extraordinary customer service and technical expertise combine to support you before, during, and after your purchase. Whether your order is big or small, you can expect the same exceptional service and support.

Need a customized flowmeter? Ask about our Custom Ordering Solutions. We can customize just about any flowmeter to meet your specific application—from using different materials of construction to configuring the instrument for various electrical outputs. We also carry flowmeters with the regulatory and agency approvals that meet your requirements: FDA, UL, CSA, ETL, CE, 3A, FM, NSF, and ATEX. Plus, a team of technically-trained Application Specialists is available to help you choose the correct flowmeter and answer any of your questions. Products recommended by our Applications Specialists have a 99.97% customer satisfaction rate! What's more, our InnoCal® metrology lab can calibrate your flowmeter to ensure its accuracy. For information on calibration, see below.



**INNOCAL®**  
INNOVATIVE CALIBRATION SOLUTIONS

**Ensure the accuracy of your flowmeter!**

Air/gas and mass flowmeter service includes an NIST-traceable calibration report with before and after test data at five to seven points across the range of the flowmeter from 0.2 to 80,000 sccm (0.002 to 80 L/min).

[TW-17080-00](#) NIST-traceable calibration with data for air/gas flowmeter

[TW-17080-10](#) NIST-traceable calibration with data for mass flowmeter

Liquid flowmeter service includes an NIST-traceable calibration report with before and after test data for flowmeters from 1 ccm to 300 LPM water (can correct for other liquids).

[TW-17080-12](#) NIST-traceable calibration with data for liquid flowmeter

**Call us today! 1-847-549-7600**

\*Please check our scope of accreditation for any limitations





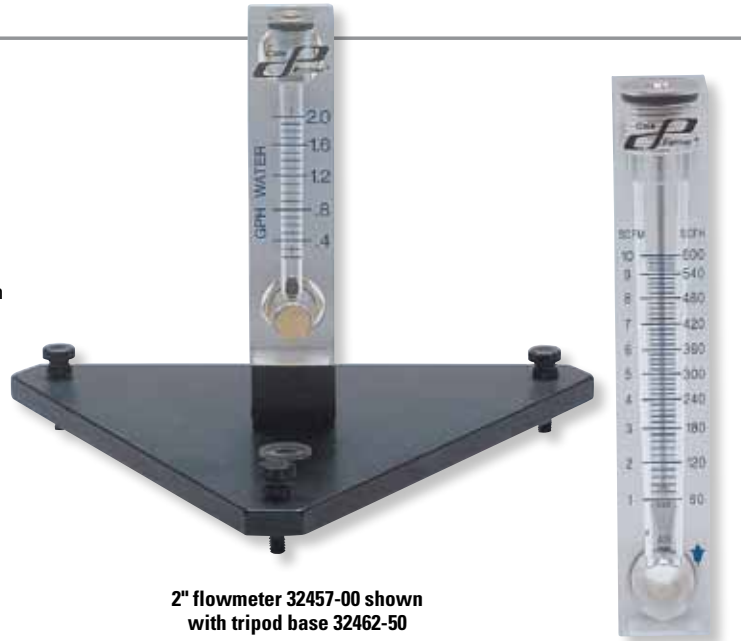
**Cole-Parmer Acrylic Flowmeters**  
**for Bench or Panel Mount**

**Durable single-piece body withstands severe shock and vibration**

- Ideal for process plant applications on air sampling equipment, gas analyzers and chemical feed systems for water treatment
- Flexible design allows for panel or bench mounting

Machined from solid acrylic blocks, these meters have integral metering tubes that provide precise readings even in aggressive plant environments. The meters' inlet/outlet ports and mounting studs are extended for easy panel installation. An alternate option is a tripod base (sold separately below) which allows for mobility from bench to bench.

**Note:** There are many additional types of acrylic flowmeters not listed here. Contact your local dealer for quotes on acrylic meters with special requirements.



2" flowmeter 32457-00 shown with tripod base 32462-50

4" flowmeter 32458-26

**Specifications**

**Accuracy**

- 2" and 50-mm flowmeters: ±5% full-scale
- 4" and 100-mm flowmeters: ±3% full-scale
- 5" and 127-mm flowmeters: ±2% full-scale

**Repeatability:** ±0.5% full-scale

**Max pressure:** 100 psi (6.9 bar)

**Max operating temp:** 150°F (65°C)

**Connections**

- 2", 4", 50-mm, and 100-mm flowmeters: 1/2" NPT(F)<sup>†</sup>
- 5" and 127-mm flowmeters: 1" NPT(F)

**Dimensions (W x H x D)**

- 2" and 50-mm flowmeters: 1" x 4" x 2 1/8" (2.5 x 10.2 x 5.4 cm)
- 4" and 100-mm flowmeters: 1 3/8" x 6 1/2" x 2 1/8" (3.5 x 16.5 x 5.4 cm)
- 5" and 127-mm flowmeters: 1 3/4" x 10 7/8" x 4 3/4" (4.4 x 27.6 x 12.1 cm)



**Materials of Construction**

Part	2" and 50 mm	4" and 100 mm	5" and 127 mm
Body	Acrylic		
Fittings	Brass		PVC
Valve	Brass		
O-rings	Buna N		
Float (for air)	Black glass (BG)	316 SS (SS)	

**English-Unit Scales**

For liquid applications				For air applications		
Cat. no.	Float <sup>‡</sup>	Flow range	Price	Cat. no.	Flow range	Price
<b>Flowmeters with 2" scale</b>						
<a href="#">TW-32457-00</a>	BG	0.2 to 2 GPH		<a href="#">TW-32457-10</a>	0.1 to 1 scfh	
<a href="#">TW-32457-02</a>	SS	0.4 to 5 GPH		<a href="#">TW-32457-12</a>	0.2 to 2 scfh	
<a href="#">TW-32457-04</a>	BG	1 to 10 GPH		<a href="#">TW-32457-14</a>	0.4 to 5 scfh	
<a href="#">TW-32457-06</a>	SS	2 to 20 GPH		<a href="#">TW-32457-16</a>	0.5 to 10 scfh	
<a href="#">TW-32457-08</a>	SS	4 to 40 GPH		<a href="#">TW-32457-18</a>	2 to 20 scfh	
—	—	—	—	<a href="#">TW-32457-20</a>	3 to 30 scfh	
—	—	—	—	<a href="#">TW-32457-22</a>	4 to 50 scfh	
—	—	—	—	<a href="#">TW-32457-24</a>	10 to 100 scfh	
—	—	—	—	<a href="#">TW-32457-26</a>	20 to 200 scfh	

<b>Flowmeters with 4" scale</b>						
<a href="#">TW-32458-00</a>	SS	1 to 10 GPH		<a href="#">TW-32458-10</a>	0.4 to 5 scfh	
<a href="#">TW-32458-02</a>	SS	2 to 25 GPH		<a href="#">TW-32458-12</a>	1 to 10 scfh	
<a href="#">TW-32458-04</a>	SS	4 to 50 GPH		<a href="#">TW-32458-14</a>	2 to 20 scfh	
<a href="#">TW-32458-06</a>	SS	6 to 60 GPH		<a href="#">TW-32458-16</a>	4 to 40 scfh	
<a href="#">TW-32458-07<sup>†</sup></a>	SS	0.2 to 2.5 GPM		<a href="#">TW-32458-18</a>	10 to 100 scfh	
<a href="#">TW-32458-08<sup>†</sup></a>	SS	0.4 to 5 GPM		<a href="#">TW-32458-20</a>	14 to 150 scfh	
—	—	—	—	<a href="#">TW-32458-22</a>	20 to 200 scfh	
—	—	—	—	<a href="#">TW-32458-24<sup>†</sup></a>	0.5 to 5 scfm	
—	—	—	—	<a href="#">TW-32458-26<sup>†</sup></a>	1 to 10 scfm	

<b>Flowmeters with 5" scale</b>						
<a href="#">TW-32462-00</a>	SS	0.4 to 5 GPM		<a href="#">TW-32462-10</a>	3 to 25 scfm	
<a href="#">TW-32462-02</a>	SS	1 to 10 GPM		<a href="#">TW-32462-12</a>	4 to 50 scfm	
<a href="#">TW-32462-04</a>	SS	2 to 20 GPM		<a href="#">TW-32462-14</a>	10 to 100 scfm	

<sup>†</sup>These models have dual scale: GPM/GPH, scfm/scfh, LPM/LPH; they also have 1/4" NPT(F) connections and use tripod base 32462-60 sold at right.

<sup>‡</sup>Float material key: BG = black glass, SS = stainless steel

**Metric-Unit Scales**

For liquid applications				For air applications		
Cat. no.	Float <sup>‡</sup>	Flow range	Price	Cat. no.	Flow range	Price
<b>Flowmeters with 50-mm scale</b>						
<a href="#">TW-32457-30</a>	BG	5 to 50 mL/min		<a href="#">TW-32457-40</a>	0.04 to 0.5 LPM	
<a href="#">TW-32457-32</a>	BG	10 to 100 mL/min		<a href="#">TW-32457-42</a>	0.1 to 1 LPM	
<a href="#">TW-32457-34</a>	SS	20 to 240 mL/min		<a href="#">TW-32457-44</a>	0.4 to 5 LPM	
—	—	—	—	<a href="#">TW-32457-46</a>	1 to 10 LPM	
—	—	—	—	<a href="#">TW-32457-48</a>	2 to 25 LPM	
—	—	—	—	<a href="#">TW-32457-50</a>	4 to 50 LPM	
—	—	—	—	<a href="#">TW-32457-52</a>	10 to 100 LPM	
<b>Flowmeters with 100-mm scale</b>						
<a href="#">TW-32458-30</a>	BG	4 to 50 mL/min		<a href="#">TW-32458-50</a>	0.4 to 5 LPM	
<a href="#">TW-32458-32</a>	SS	10 to 120 mL/min		<a href="#">TW-32458-52</a>	1 to 10 LPM	
<a href="#">TW-32458-34</a>	BG	25 to 225 mL/min		<a href="#">TW-32458-54</a>	2 to 20 LPM	
<a href="#">TW-32458-36</a>	SS	40 to 400 mL/min		<a href="#">TW-32458-56</a>	3 to 30 LPM	
<a href="#">TW-32458-38</a>	SS	40 to 660 mL/min		<a href="#">TW-32458-58</a>	4 to 50 LPM	
<a href="#">TW-32458-40</a>	SS	100 to 1500 mL/min		<a href="#">TW-32458-60</a>	10 to 100 LPM	
<a href="#">TW-32458-42</a>	SS	200 to 3000 mL/min		<a href="#">TW-32458-62<sup>†</sup></a>	14 to 140 LPM	
<a href="#">TW-32458-44<sup>†</sup></a>	SS	0.8 to 9 LPM		<a href="#">TW-32458-64<sup>†</sup></a>	30 to 280 LPM	
<a href="#">TW-32458-46<sup>†</sup></a>	SS	1.5 to 20 LPM		<a href="#">TW-32458-65<sup>†</sup></a>	80 to 560 LPM	
<b>Flowmeters with 127-mm scale</b>						
<a href="#">TW-32462-20</a>	SS	1 to 15 LPM		<a href="#">TW-32462-30</a>	100 to 700 LPM	
<a href="#">TW-32462-22</a>	SS	4 to 36 LPM		<a href="#">TW-32462-32</a>	100 to 1400 LPM	
<a href="#">TW-32462-24</a>	SS	5 to 75 LPM		<a href="#">TW-32462-34</a>	400 to 3000 LPM	

**Tripod Bases**

Durable acrylic base with three leveling screws and spirit level.

Catalog number	Description	Price
<a href="#">TW-32462-50</a>	For one flowmeter with 2" or 50-mm scale	
<a href="#">TW-32462-55</a>	For one flowmeter with 4" or 100-mm scale	
<a href="#">TW-32462-60</a>	For one flowmeter with 1/4" connections	

**MORE online!**

For pressure drop information for these flowmeters, go to . . .

[ColeParmer.com](http://ColeParmer.com)



# Flowmeters

## Variable Area, Direct Reading

### Cole-Parmer® Valved Acrylic Flowmeters for Bench or Panel Mount

Meter with valve provides flow control through a highly durable meter body

- Ideal for process plant applications on air sampling equipment, gas analyzers and chemical feed systems for water treatment
- Integrated precision valve allows precise manual flow across the full scale
- The flexible design allows for panel or bench mounting

Machined from solid acrylic blocks, these meters have integral metering tubes that provide precise readings even in aggressive plant environments. The meters' inlet/outlet ports and mounting studs are extended for easy panel installation. An alternate option is a tripod base (sold separately below) which allows for mobility from bench to bench.

**Note:** There are many additional types of acrylic flowmeters not listed here. Contact your local dealer for quotes on acrylic meters with special requirements.

#### Specifications

##### Accuracy

- 2" and 50-mm flowmeters: ±5% full-scale
- 4" and 100-mm flowmeters: ±3% full-scale
- 5" and 127-mm flowmeters: ±2% full-scale

Repeatability: ±0.5% full-scale

Media type: liquids or gases

Max pressure: 100 psi (6.9 bar)

Max operating temp: 150°F (65°C)

##### Connections

- 2", 4", 50-mm, and 100-mm flowmeters: ½" NPT(F)†
- 5" and 127-mm flowmeters: 1" NPT(F)

##### Dimensions (W x H x D)

- (not including valve stem):
- 2" and 50-mm flowmeters: 1" x 4" x 2½" (2.5 x 10.2 x 5.4 cm)
- 4" and 100-mm flowmeters: 1¾" x 6½" x 2½" (3.5 x 16.5 x 5.4 cm)
- 5" and 127-mm flowmeters: 1¾" x 10¾" x 4¾" (4.4 x 27.6 x 12.1 cm)

##### Materials of Construction

Part	2" and 50 mm	4" and 100 mm	5" and 127 mm
Body	Acrylic		
Fittings	Brass		PVC
Valve	Brass		
O-rings	Buna N		
Float (for air)	Black glass (BG)	316 SS (SS)	

#### English-Unit Scales

For liquid applications				For air applications		
Cat. no.	Float‡	Flow range	Price	Cat. no.	Flow range	Price
<b>Flowmeters with 2" scale</b>						
TW-32460-00	BG	0.2 to 2 GPH	—	TW-32460-10	0.1 to 1 scfh	—
TW-32460-02	SS	0.4 to 5 GPH	—	TW-32460-12	0.2 to 2 scfh	—
TW-32460-04	BG	1 to 10 GPH	—	TW-32460-14	0.4 to 5 scfh	—
TW-32460-06	SS	2 to 20 GPH	—	TW-32460-16	0.5 to 10 scfh	—
TW-32460-08	SS	4 to 40 GPH	—	TW-32460-18	2 to 20 scfh	—
—	—	—	—	TW-32460-20	3 to 30 scfh	—
—	—	—	—	TW-32460-22	4 to 50 scfh	—
—	—	—	—	TW-32460-24	10 to 100 scfh	—
—	—	—	—	TW-32460-26	20 to 200 scfh	—
<b>Flowmeters with 4" scale</b>						
TW-32461-00	SS	1 to 10 GPH	—	TW-32461-10	0.4 to 5 scfh	—
TW-32461-02	SS	2 to 25 GPH	—	TW-32461-12	1 to 10 scfh	—
TW-32461-04	SS	4 to 50 GPH	—	TW-32461-14	2 to 20 scfh	—
TW-32461-06	SS	6 to 60 GPH	—	TW-32461-16	4 to 40 scfh	—
TW-32461-07†	SS	0.2 to 2.5 GPM	—	TW-32461-18	10 to 100 scfh	—
TW-32461-08†	SS	0.4 to 5 GPM	—	TW-32461-20	14 to 150 scfh	—
—	—	—	—	TW-32461-22	20 to 200 scfh	—
—	—	—	—	TW-32461-24†	0.5 to 5 scfm	—
—	—	—	—	TW-32461-26†	1 to 10 scfm	—
<b>Flowmeters with 5" scale</b>						
TW-32466-50	SS	1 to 10 GPM	—	TW-32466-60	3 to 25 scfm	—
TW-32466-52	SS	2 to 20 GPM	—	TW-32466-62	4 to 50 scfm	—
—	—	—	—	TW-32466-64	10 to 100 scfm	—

†These models have dual scale: GPM/GPH, scfm/scfh, LPM/LPH; they also have ¼" NPT(F) connections and use tripod base 32462-60 sold at right.

‡Float material key: BG = black glass, SS = stainless steel



2" Flowmeter 32460-18 shown with tripod base 32462-50



4" flowmeter 32461-08

**INNOCAL®**  
INNOVATIVE CALIBRATION SOLUTIONS

Ensure the accuracy of your flowmeter!

TW-17080-00 NIST-traceable calibration with data for air/gas flowmeter . . . . .

TW-17080-12 NIST-traceable calibration with data for liquid flowmeter . . . . .

#### Metric-Unit Scales

For liquid applications				For air applications		
Cat. no.	Float‡	Flow range	Price	Cat. no.	Flow range	Price
<b>Flowmeters with 50-mm scale</b>						
TW-32460-30	BG	5 to 50 mL/min	—	TW-32460-40	0.04 to 0.5 LPM	—
TW-32460-32	SS	10 to 100 mL/min	—	TW-32460-42	0.1 to 1 LPM	—
TW-32460-34	SS	20 to 240 mL/min	—	TW-32460-44	0.4 to 5 LPM	—
—	—	—	—	TW-32460-46	1 to 10 LPM	—
—	—	—	—	TW-32460-48	2 to 25 LPM	—
—	—	—	—	TW-32460-50	4 to 50 LPM	—
—	—	—	—	TW-32460-52	10 to 100 LPM	—
<b>Flowmeters with 100-mm scale</b>						
TW-32461-30	SS	4 to 50 mL/min	—	TW-32461-50	0.4 to 5 LPM	—
TW-32461-32	SS	10 to 120 mL/min	—	TW-32461-52	1 to 10 LPM	—
TW-32461-34	BG	25 to 225 mL/min	—	TW-32461-54	2 to 20 LPM	—
TW-32461-36	SS	40 to 400 mL/min	—	TW-32461-56	3 to 30 LPM	—
TW-32461-38	SS	40 to 660 mL/min	—	TW-32461-58	4 to 50 LPM	—
TW-32461-40	SS	100 to 1500 mL/min	—	TW-32461-60	10 to 100 LPM	—
TW-32461-42	SS	200 to 3000 mL/min	—	TW-32461-62†	14 to 140 LPM	—
TW-32461-44†	SS	0.8 to 9 LPM	—	TW-32461-64†	30 to 280 LPM	—
TW-32461-46†	SS	1.5 to 20 LPM	—	—	—	—
<b>Flowmeters with 127-mm scale</b>						
TW-32466-54	SS	4 to 36 LPM	—	TW-32466-66	100 to 700 LPM	—
TW-32466-56	SS	5 to 75 LPM	—	TW-32466-68	100 to 1400 LPM	—
—	—	—	—	TW-32466-70	400 to 3400 LPM	—

#### Tripod Bases

Durable acrylic base with three leveling screws and spirit level.

Catalog number	Description	Price
TW-32462-50	For one flowmeter with 2" or 50-mm scale	—
TW-32462-55	For one flowmeter with 4" or 100-mm scale	—
TW-32462-60	For one flowmeter with ¼" connections	—



**Cole-Parmer Acrylic Flowmeters for Gases and Water**

Designed for labs and plant processes where multiple gases are used

- Direct-reading English and metric scales

Versatile acrylic flowmeters are designed specifically for air, oxygen, nitrogen, carbon dioxide, argon, helium, or water. Meters are offered with or without built-in low hysteresis needle valves. Meters without valves can be panel mounted or used in partial or full in-line mounted configurations. Easily disassemble meters for cleaning. Flowmeters feature a stable, easy-to-read float.

**NEW**



**Specifications**

**Accuracy:** ±5% full-scale  
**Max pressure:** 100 psi (6.9 bar)  
**Max operating temp:** 150°F (65°C)  
**Connections:** 1/8" NPT(F)

**Materials of Construction**

Body	Acrylic	
Fittings	Brass	316 SS
O-rings	Buna N	Viton®



68560-24

Max flow rate	Float	Flowmeters without valve				Flowmeters with valve			
		Brass fittings		316 SS fittings		Brass fittings		316 SS fittings	
		Catalog number	Price	Catalog number	Price	Catalog number	Price	Catalog number	Price
<b>Air flowmeters</b>									
2.8 scfh	1.4 L/min	Glass	<a href="#">TW-68560-00</a>		<a href="#">TW-68560-07</a>		<a href="#">TW-68560-14</a>		<a href="#">TW-68560-21</a>
5.5 scfh	2.75 L/min	SS	<a href="#">TW-68560-01</a>		<a href="#">TW-68560-08</a>		<a href="#">TW-68560-15</a>		<a href="#">TW-68560-22</a>
7 scfh	3.5 L/min	Carboloy	<a href="#">TW-68560-02</a>		<a href="#">TW-68560-09</a>		<a href="#">TW-68560-16</a>		<a href="#">TW-68560-23</a>
18 scfh	8.5 L/min	Glass	<a href="#">TW-68560-03</a>		<a href="#">TW-68560-10</a>		<a href="#">TW-68560-17</a>		<a href="#">TW-68560-24</a>
32.5 scfh	16 L/min	SS	<a href="#">TW-68560-04</a>		<a href="#">TW-68560-11</a>		<a href="#">TW-68560-18</a>		<a href="#">TW-68560-25</a>
45 scfh	22 L/min	Carboloy	<a href="#">TW-68560-05</a>		<a href="#">TW-68560-12</a>		<a href="#">TW-68560-19</a>		<a href="#">TW-68560-26</a>
100 scfh	50 L/min	SS	<a href="#">TW-68560-06</a>		<a href="#">TW-68560-13</a>		<a href="#">TW-68560-20</a>		<a href="#">TW-68560-27</a>
<b>Oxygen flowmeters</b>									
2.5 scfh	1.2 L/min	Glass	<a href="#">TW-68560-28</a>		<a href="#">TW-68560-35</a>		<a href="#">TW-68560-42</a>		<a href="#">TW-68560-49</a>
5 scfh	2.5 L/min	SS	<a href="#">TW-68560-29</a>		<a href="#">TW-68560-36</a>		<a href="#">TW-68560-43</a>		<a href="#">TW-68560-50</a>
7 scfh	3.5 L/min	Carboloy	<a href="#">TW-68560-30</a>		<a href="#">TW-68560-37</a>		<a href="#">TW-68560-44</a>		<a href="#">TW-68560-51</a>
16 scfh	8 L/min	Glass	<a href="#">TW-68560-31</a>		<a href="#">TW-68560-38</a>		<a href="#">TW-68560-45</a>		<a href="#">TW-68560-52</a>
30 scfh	15 L/min	SS	<a href="#">TW-68560-32</a>		<a href="#">TW-68560-39</a>		<a href="#">TW-68560-46</a>		<a href="#">TW-68560-53</a>
42.5 scfh	20 L/min	Carboloy	<a href="#">TW-68560-33</a>		<a href="#">TW-68560-40</a>		<a href="#">TW-68560-47</a>		<a href="#">TW-68560-54</a>
90 scfh	45 L/min	SS	<a href="#">TW-68560-34</a>		<a href="#">TW-68560-41</a>		<a href="#">TW-68560-48</a>		<a href="#">TW-68560-55</a>
<b>Nitrogen flowmeters</b>									
2.75 scfh	1.3 L/min	Glass	<a href="#">TW-68560-56</a>		<a href="#">TW-68560-63</a>		<a href="#">TW-68560-70</a>		<a href="#">TW-68560-77</a>
5.5 scfh	2.75 L/min	SS	<a href="#">TW-68560-57</a>		<a href="#">TW-68560-64</a>		<a href="#">TW-68560-71</a>		<a href="#">TW-68560-78</a>
7.5 scfh	3.5 L/min	Carboloy	<a href="#">TW-68560-58</a>		<a href="#">TW-68560-65</a>		<a href="#">TW-68560-72</a>		<a href="#">TW-68560-79</a>
16 scfh	8 L/min	Glass	<a href="#">TW-68560-59</a>		<a href="#">TW-68560-66</a>		<a href="#">TW-68560-73</a>		<a href="#">TW-68560-80</a>
32.5 scfh	16 L/min	SS	<a href="#">TW-68560-60</a>		<a href="#">TW-68560-67</a>		<a href="#">TW-68560-74</a>		<a href="#">TW-68560-81</a>
45 scfh	22 L/min	Carboloy	<a href="#">TW-68560-61</a>		<a href="#">TW-68560-68</a>		<a href="#">TW-68560-75</a>		<a href="#">TW-68560-82</a>
100 scfh	45 L/min	SS	<a href="#">TW-68560-62</a>		<a href="#">TW-68560-69</a>		<a href="#">TW-68560-76</a>		<a href="#">TW-68560-83</a>
<b>Carbon dioxide flowmeters</b>									
2.2 scfh	1.1 L/min	Glass	<a href="#">TW-68560-84</a>		<a href="#">TW-68560-91</a>		<a href="#">TW-68561-00</a>		<a href="#">TW-68561-07</a>
5 scfh	2 L/min	SS	<a href="#">TW-68560-85</a>		<a href="#">TW-68560-92</a>		<a href="#">TW-68561-01</a>		<a href="#">TW-68561-08</a>
6.5 scfh	3 L/min	Carboloy	<a href="#">TW-68560-86</a>		<a href="#">TW-68560-93</a>		<a href="#">TW-68561-02</a>		<a href="#">TW-68561-09</a>
15 scfh	7 L/min	Glass	<a href="#">TW-68560-87</a>		<a href="#">TW-68560-94</a>		<a href="#">TW-68561-03</a>		<a href="#">TW-68561-10</a>
25 scfh	12 L/min	SS	<a href="#">TW-68560-88</a>		<a href="#">TW-68560-95</a>		<a href="#">TW-68561-04</a>		<a href="#">TW-68561-11</a>
37.5 scfh	18 L/min	Carboloy	<a href="#">TW-68560-89</a>		<a href="#">TW-68560-96</a>		<a href="#">TW-68561-05</a>		<a href="#">TW-68561-12</a>
80 scfh	35 L/min	SS	<a href="#">TW-68560-90</a>		<a href="#">TW-68560-97</a>		<a href="#">TW-68561-06</a>		<a href="#">TW-68561-13</a>
<b>Argon flowmeters</b>									
2.25 scfh	1.1 L/min	Glass	<a href="#">TW-68561-14</a>		<a href="#">TW-68561-21</a>		<a href="#">TW-68561-28</a>		<a href="#">TW-68561-35</a>
5 scfh	2.2 L/min	SS	<a href="#">TW-68561-15</a>		<a href="#">TW-68561-22</a>		<a href="#">TW-68561-29</a>		<a href="#">TW-68561-36</a>
6.5 scfh	3 L/min	Carboloy	<a href="#">TW-68561-16</a>		<a href="#">TW-68561-23</a>		<a href="#">TW-68561-30</a>		<a href="#">TW-68561-37</a>
15 scfh	7 L/min	Glass	<a href="#">TW-68561-17</a>		<a href="#">TW-68561-24</a>		<a href="#">TW-68561-31</a>		<a href="#">TW-68561-38</a>
26 scfh	13 L/min	SS	<a href="#">TW-68561-18</a>		<a href="#">TW-68561-25</a>		<a href="#">TW-68561-32</a>		<a href="#">TW-68561-39</a>
37.5 scfh	18 L/min	Carboloy	<a href="#">TW-68561-19</a>		<a href="#">TW-68561-26</a>		<a href="#">TW-68561-33</a>		<a href="#">TW-68561-40</a>
80 scfh	40 L/min	SS	<a href="#">TW-68561-20</a>		<a href="#">TW-68561-27</a>		<a href="#">TW-68561-34</a>		<a href="#">TW-68561-41</a>
<b>Helium flowmeters</b>									
4 scfh	2 L/min	Glass	<a href="#">TW-68561-42</a>		<a href="#">TW-68561-49</a>		<a href="#">TW-68561-56</a>		<a href="#">TW-68561-63</a>
11 scfh	5.5 L/min	SS	<a href="#">TW-68561-43</a>		<a href="#">TW-68561-50</a>		<a href="#">TW-68561-57</a>		<a href="#">TW-68561-64</a>
17 scfh	8 L/min	Carboloy	<a href="#">TW-68561-44</a>		<a href="#">TW-68561-51</a>		<a href="#">TW-68561-58</a>		<a href="#">TW-68561-65</a>
40 scfh	18 L/min	Glass	<a href="#">TW-68561-45</a>		<a href="#">TW-68561-52</a>		<a href="#">TW-68561-59</a>		<a href="#">TW-68561-66</a>
70 scfh	35 L/min	SS	<a href="#">TW-68561-46</a>		<a href="#">TW-68561-53</a>		<a href="#">TW-68561-60</a>		<a href="#">TW-68561-67</a>
110 scfh	55 L/min	Carboloy	<a href="#">TW-68561-47</a>		<a href="#">TW-68561-54</a>		<a href="#">TW-68561-61</a>		<a href="#">TW-68561-68</a>
250 scfh	110 L/min	SS	<a href="#">TW-68561-48</a>		<a href="#">TW-68561-55</a>		<a href="#">TW-68561-62</a>		<a href="#">TW-68561-69</a>
<b>Water flowmeters</b>									
0.3 GPH	20 mL/min	Glass	<a href="#">TW-68561-70</a>		<a href="#">TW-68561-77</a>		<a href="#">TW-68561-84</a>		<a href="#">TW-68561-91</a>
1.1 GPH	70 mL/min	SS	<a href="#">TW-68561-71</a>		<a href="#">TW-68561-78</a>		<a href="#">TW-68561-85</a>		<a href="#">TW-68561-92</a>
1.5 GPH	100 mL/min	Carboloy	<a href="#">TW-68561-72</a>		<a href="#">TW-68561-79</a>		<a href="#">TW-68561-86</a>		<a href="#">TW-68561-93</a>
2.75 GPH	175 mL/min	Glass	<a href="#">TW-68561-73</a>		<a href="#">TW-68561-80</a>		<a href="#">TW-68561-87</a>		<a href="#">TW-68561-94</a>
6.5 GPH	450 mL/min	SS	<a href="#">TW-68561-74</a>		<a href="#">TW-68561-81</a>		<a href="#">TW-68561-88</a>		<a href="#">TW-68561-95</a>
11 GPH	700 mL/min	Carboloy	<a href="#">TW-68561-75</a>		<a href="#">TW-68561-82</a>		<a href="#">TW-68561-89</a>		<a href="#">TW-68561-96</a>
22 GPH	1400 mL/min	SS	<a href="#">TW-68561-76</a>		<a href="#">TW-68561-83</a>		<a href="#">TW-68561-90</a>		<a href="#">TW-68561-97</a>



# Flowmeters

## Variable Area, Direct Reading

### Cole-Parmer Acrylic Flowmeter Kits

Seven interchangeable scales for routine gases and water offer flexibility

- Stable, easy-to-read float
- English and metric scales
- Easy disassembly for cleaning

These versatile acrylic flowmeter kits come with seven interchangeable back plates for routine gases (air, water, argon, carbon dioxide, helium, nitrogen, and oxygen). Meters are offered with or without built-in low hysteresis needle valves. Meters without valve can be panel mounted, or used in partial or full in-line mounted configurations.

#### Specifications

**Accuracy:** ±5% full-scale  
**Max operating temp:** 150°F (65°C)  
**Max pressure:** 100 psi (6.9 bar)  
**Connections:** 1/8" NPT(F)



#### Materials of Construction

Body	Acrylic	
Fittings	Brass	316 SS
O-rings	Buna N	Viton®

34500-52



Max flow rate, L/min (scfh)							Float	Flowmeters without valve		Flowmeters with valve	
Air	Water (GPH)	Argon	CO <sub>2</sub>	Helium	Nitrogen	Oxygen		Brass fittings	Stainless steel fittings	Brass fittings	Stainless steel fittings
								Catalog number	Catalog number	Catalog number	Catalog number
1.2 (2.6)	20 (0.3)	1 (2)	1.1 (2.5)	2 (4)	1.3 (2.75)	1.1 (2.5)	Glass	<a href="#">TW-34500-10</a>	<a href="#">TW-34500-14</a>	<a href="#">TW-34500-12</a>	<a href="#">TW-34500-16</a>
2.5 (5.5)	70 (1.1)	2 (5)	2 (5)	5 (10)	2.5 (5.5)	2.25 (5)	Stainless steel	<a href="#">TW-34500-18</a>	<a href="#">TW-34500-24</a>	<a href="#">TW-34500-22</a>	<a href="#">TW-34500-26</a>
3.5 (7)	100 (1.5)	3 (6.5)	3 (6.5)	8 (17)	3.5 (7.5)	3.5 (7)	Carboly	<a href="#">TW-34500-28</a>	<a href="#">TW-34500-32</a>	<a href="#">TW-34500-30</a>	<a href="#">TW-34500-34</a>
8.5 (18)	175 (2.75)	7 (15)	7 (15)	18 (40)	8 (16)	8 (16)	Glass	<a href="#">TW-34500-36</a>	<a href="#">TW-34500-40</a>	<a href="#">TW-34500-38</a>	<a href="#">TW-34500-42</a>
16 (32.5)	450 (6.5)	13 (26)	12 (25)	35 (70)	16 (32.5)	15 (30)	Stainless steel	<a href="#">TW-34500-44</a>	<a href="#">TW-34500-48</a>	<a href="#">TW-34500-46</a>	<a href="#">TW-34500-52</a>
22 (45)	700 (11)	18 (37.5)	18 (37.5)	55 (110)	22 (45)	20 (42.5)	Carboly	<a href="#">TW-34500-54</a>	<a href="#">TW-34500-58</a>	<a href="#">TW-34500-56</a>	<a href="#">TW-34500-60</a>
							Price				

### Cole-Parmer Direct-Reading Multigas Flowmeters

Rotating flowtube allows one meter to be used for five gases

- Rigid, high-quality, compact construction
- Flow graduations in English or metric units

Designed for medium flow range applications, these flowmeters incorporate precision-machined glass and brass or stainless steel frames to provide accurate and economical flow metering solutions. Simply rotate glass flowtube to read the gas you will be using—oxygen, nitrogen, helium, carbon dioxide, and argon.

#### Specifications

**Accuracy:** ±5% full-scale  
**Max pressure:** 150 psi (10.3 bar)  
**Max operating temp:** 250°F (121°C)  
**Connections:** 3/8" NPT(F)  
**Dimensions (W x H)**  
 In-line (including fitting): 2" (5.1 cm) x 11" (28 cm)  
 Panel-mount: 2" (5.1 cm) x 10 1/4" (26 cm)



#### Materials of Construction

Part	Brass	316 SS
Flowtube	Borosilicate glass	
Fittings, valves	Brass	316 SS
O-rings	Viton®	
Float	316 stainless steel	
Frame	Polycarbonate	



32605-36

Maximum flow rate					Flowmeters without valve				Flowmeters with valve			
O <sub>2</sub>	N <sub>2</sub>	He	CO <sub>2</sub>	Ar	Brass fittings		316 SS fittings		Brass fittings		316 SS fittings	
					Catalog number	Price	Catalog number	Price	Catalog number	Price	Catalog number	Price
<b>In-line flowmeters with English units (scfm)</b>												
4.5	4.5	12	3.8	4.2	<a href="#">TW-32605-00</a>		<a href="#">TW-32605-05</a>		<a href="#">TW-32605-10</a>		<a href="#">TW-32605-15</a>	
9	9.5	23	8	8	<a href="#">TW-32605-01</a>		<a href="#">TW-32605-06</a>		<a href="#">TW-32605-11</a>		<a href="#">TW-32605-16</a>	
14	14	35	12.5	12.5	<a href="#">TW-32605-02</a>		<a href="#">TW-32605-07</a>		<a href="#">TW-32605-12</a>		<a href="#">TW-32605-17</a>	
18	19	42.5	15.5	15.5	<a href="#">TW-32605-03</a>		<a href="#">TW-32605-08</a>		<a href="#">TW-32605-13</a>		<a href="#">TW-32605-18</a>	
28	30	60	24	26	<a href="#">TW-32605-04</a>		<a href="#">TW-32605-09</a>		<a href="#">TW-32605-14</a>		<a href="#">TW-32605-19</a>	
<b>In-line flowmeters with metric units (sL/min)</b>												
130	130	350	105	120	<a href="#">TW-32605-20</a>		<a href="#">TW-32605-26</a>		<a href="#">TW-32605-31</a>		<a href="#">TW-32605-36</a>	
260	270	650	220	230	<a href="#">TW-32605-21</a>		<a href="#">TW-32605-27</a>		<a href="#">TW-32605-32</a>		<a href="#">TW-32605-37</a>	
400	400	1000	360	360	<a href="#">TW-32605-22</a>		<a href="#">TW-32605-28</a>		<a href="#">TW-32605-33</a>		<a href="#">TW-32605-38</a>	
525	550	1250	440	440	<a href="#">TW-32605-24</a>		<a href="#">TW-32605-29</a>		<a href="#">TW-32605-34</a>		<a href="#">TW-32605-39</a>	
800	850	1800	700	750	<a href="#">TW-32605-25</a>		<a href="#">TW-32605-30</a>		<a href="#">TW-32605-35</a>		<a href="#">TW-32605-40</a>	
<b>Panel-mount flowmeters with English units (scfm)</b>												
4.5	4.5	12	3.8	4.2	<a href="#">TW-32605-41</a>		<a href="#">TW-32605-46</a>		<a href="#">TW-32605-51</a>		<a href="#">TW-32605-56</a>	
9	9.5	23	8	8	<a href="#">TW-32605-42</a>		<a href="#">TW-32605-47</a>		<a href="#">TW-32605-52</a>		<a href="#">TW-32605-57</a>	
14	14	35	12.5	12.5	<a href="#">TW-32605-43</a>		<a href="#">TW-32605-48</a>		<a href="#">TW-32605-53</a>		<a href="#">TW-32605-58</a>	
18	19	42.5	15.5	15.5	<a href="#">TW-32605-44</a>		<a href="#">TW-32605-49</a>		<a href="#">TW-32605-54</a>		<a href="#">TW-32605-59</a>	
28	30	60	24	26	<a href="#">TW-32605-45</a>		<a href="#">TW-32605-50</a>		<a href="#">TW-32605-55</a>		<a href="#">TW-32605-60</a>	
<b>Panel-mount flowmeters with metric units (sL/min)</b>												
130	130	350	105	120	<a href="#">TW-32605-61</a>		<a href="#">TW-32605-66</a>		<a href="#">TW-32605-71</a>		<a href="#">TW-32605-76</a>	
260	270	650	220	230	<a href="#">TW-32605-62</a>		<a href="#">TW-32605-67</a>		<a href="#">TW-32605-72</a>		<a href="#">TW-32605-77</a>	
400	400	1000	360	360	<a href="#">TW-32605-63</a>		<a href="#">TW-32605-68</a>		<a href="#">TW-32605-73</a>		<a href="#">TW-32605-78</a>	
525	550	1250	440	440	<a href="#">TW-32605-64</a>		<a href="#">TW-32605-69</a>		<a href="#">TW-32605-74</a>		<a href="#">TW-32605-79</a>	
800	850	1800	700	750	<a href="#">TW-32605-65</a>		<a href="#">TW-32605-70</a>		<a href="#">TW-32605-75</a>		<a href="#">TW-32605-80</a>	



**Cole-Parmer**  
**Acrylic In-Line Flowmeters**

**Highly durable compact design**

- Block body with brass-reinforced connections—virtually unbreakable
- Large scale on a flat surface is easy to read
- Many versions have dual time-unit scales

Designed for rough-duty installations, a built-in guide rod stabilizes the float for easier reading. These are suitable for most general process fluids (brass reinforcing the connection does not come in contact with the fluid). Common applications are for RO systems, air-sampling skids and chemical feed systems in water treatment.



Flowmeter for air 32445-00

Flowmeter for air 32445-08

**Specifications**

Connection	Accuracy	Dimensions (W x H x D)
1/4" NPT(M)	±5%	1" x 5 1/2" x 1 1/8" (2.5 x 13.6 x 2.8 cm)
1/2" NPT(F)	±3%	1 1/2" x 9 1/4" x 1 5/8" (3.8 x 23.5 x 4.1 cm)
3/4" NPT(F)		1 1/2" x 11 1/4" x 1 5/8" (3.8 x 28.6 x 4.1 cm)



**Media type:** water or air

**Max pressure:** 100 psig (6.9 bar)

**Max operating temp:** 150°F (65°C)

**Materials of Construction**

Body	Acrylic
Fittings	PVC
Float	316 SS
O-rings	Buna N
Guide rod	SS

Catalog number	Flow range	Connections	Price
<b>For water</b>			
TW-32445-50	1 to 12 GPH	1/4" NPT(M)	
TW-32445-52	4 to 25 GPH		
TW-32445-54	6 to 60 GPH		
TW-32445-56	30 to 150 GPH/0.5 to 2.5 GPM	1/2" NPT(F)	
TW-32445-58	24 to 300 GPH/0.4 to 5 GPM		
TW-32445-60	60 to 600 GPH/1 to 10 GPM		
TW-32445-62	90 to 900 GPH/1.5 to 15 GPM	3/4" NPT(F)	
TW-32445-64	120 to 1200 GPH/2 to 20 GPM		
TW-32445-66	4 to 50 LPH		
TW-32445-68	15 to 100 LPH	1/4" NPT(M)	
TW-32445-70	30 to 230 LPH		
TW-32445-72	120 to 600 LPH/2 to 10 LPM		
TW-32445-74	120 to 1200 LPH/2 to 20 LPM	1/2" NPT(F)	
TW-32445-76	240 to 2400 LPH/4 to 40 LPM		
TW-32445-78	360 to 3600 LPH/6 to 60 LPM		
TW-32445-80	480 to 4200 LPH/8 to 70 LPM	3/4" NPT(F)	
<b>For air</b>			
TW-32445-00	6 to 60 scfh	1/4" NPT(M)	
TW-32445-02	15 to 100 scfh		
TW-32445-04	25 to 300 scfh		
TW-32445-06	180 to 720 scfh/3 to 12 scfm	1/2" NPT(F)	
TW-32445-08	180 to 1500 scfh/3 to 25 scfm		
TW-32445-10	300 to 3000 scfh/5 to 50 scfm		
TW-32445-11	600 to 4800 scfh/10 to 80 scfm	3/4" NPT(F)	
TW-32445-12	200 to 1700 LPH	1/4" NPT(M)	
TW-32445-14	500 to 3000 LPH		
TW-32445-16	1000 to 8500 LPH		
TW-32445-18	4800 to 20,400 LPH/80 to 340 LPM	1/2" NPT(F)	
TW-32445-20	6000 to 42,000 LPH/100 to 700 LPM		
TW-32445-22	9000 to 90,000 LPH/150 to 1500 LPM		
TW-32445-23	12,000 to 13,200 LPH/200 to 2200 LPM		

**Cole-Parmer**  
**High-Flow Acrylic In-Line Flowmeters**

**Durable design includes union ends for easy installation and maintenance**

The one-piece clear acrylic construction is ideal for damp or corrosive process environments. The stainless steel float moves on a guide rod to help provide a steady read. Scales printed right on the flow tube make accurate readings easier in tough conditions or for dirty fluids.



Flowmeter 32448-04 with stainless steel fittings

Flowmeter 32448-32 with PVC fittings

**Specifications**

**Accuracy:** ±5% full-scale

**Media type:** liquids or gases

**Max pressure:** 100 psig (6.9 bar)

**Max operating temp:** 150°F (65°C)

**Dimensions (W x H x D)**

Meters with 1 1/2" connection: 3 1/2" x 13 3/8" x 3 1/2" (8.9 x 34.0 x 8.9 cm)

Meters with 2" connection: 4 1/8" x 13 3/8" x 4 1/8" (10.5 x 34.6 x 10.5 cm)

**Materials of Construction**

Body	Acrylic
Fittings	PVC SS
O-rings	Buna N
Float	Aluminum or SS
Guide rod	SS

Flow range	Connections	PVC fittings		SS fittings	
		Cat. no.	Price	Cat. no.	Price
<b>For water</b>					
3 to 30 GPM	1 1/2" NPT(F)	TW-32448-00		TW-32448-04	
4 to 40 GPM		TW-32448-06		—	—
5 to 50 GPM		TW-32448-12		—	—
6 to 60 GPM	2" NPT(F)	TW-32448-20		—	—
8 to 80 GPM		TW-32448-26		TW-32448-30	
10 to 100 GPM		TW-32448-32		TW-32448-36	
<b>For air</b>					
20 to 240 scfm	2" NPT(F)	TW-32448-50		TW-32448-54	



**Ensure the accuracy of your flowmeter!**

**TW-17080-00 NIST-traceable calibration** with data for air/gas flowmeter

**TW-17080-12 NIST-traceable calibration** with data for liquid flowmeter



# Flowmeters

Variable Area, Direct Reading



32900-62

## High-Accuracy Oxygen and Air Flowmeters

### Ideal for use in aquaculture, medical, and laboratory processes

- Available for use with both oxygen and breathing air
- Precision control valve provides accurate, leak-free flow control
- Machined brass base with integral DISS fitting and plated with a high-gloss chrome-like finish

These accurate, low-cost flowmeters are perfect for fish farms, welding apparatus, and medical devices that need to regulate oxygen and air into processes. Flowmeters are made with high-impact resistant Lexan® shield and flow tube. Combined with a sturdy machined brass base, these meters will stand up to the rigors of clinical or field use. The durable, stainless steel stem valve ensures precise control throughout the full flow range and provides for positive flow shut-off. O-ring seals eliminate the leaks that are commonly associated with plastic-base models. Meters are calibrated at 50 psig inlet pressure for accurate flow measurement under a variety of operating conditions. Models 32900-62 and -66 are cleared for oxygen use.

### Specifications

**Media type:** oxygen and air

**Accuracy**

- 1/8 to 4 LPM: ±0.2 LPM
- 4 to 8 LPM: ±0.4 LPM
- 8 to 15 LPM: ±0.6 LPM

**Repeatability:** ±1% full-scale

**Max pressure:** 100 psig (6.9 bar)

**Operating temp:**

32 to 150°F (0 to 65°C)

**Connections:** 1/8" NPT (F) inlet,  
1/16-18" male DISS outlet

**Dimensions**

Fitting-to-fitting: 1 1/16" (1.75 cm)  
Height: 5 1/4" (13.3 cm)

### Materials of Construction

Case	Brass
Flow tube, shield	Lexan®
Fittings	Nickel-plated brass
O-rings	Buna N



Flow range (LPM)	Float	For oxygen		For air	
		Catalog number	Price	Catalog number	Price
1/8 to 3 1/2	Black glass	<a href="#">TW-32900-62</a>		—	—
1/4 to 8	Black glass	<a href="#">TW-32900-64</a>		<a href="#">TW-32900-68</a>	
1/2 to 15	Stainless steel	<a href="#">TW-32900-66</a>		<a href="#">TW-32900-72</a>	



## Impact-Resistant Polycarbonate Flowmeters

### Precision-adjusting valve for accurate, leak-free flow control

- High-quality construction
- Economy combined with high accuracy
- Ideal for OEM applications

Molded of high-impact-resistant polycarbonate, these direct-reading flowmeters are supplied with scales in both English and metric units for liquid and air—all with a 10:1 turndown ratio. These flowmeters have been designed to maintain maximum pressures to 100 psig and temperatures to 150°F (65°C).

### Specifications

**Media type:** noncaustic liquids and air

**Accuracy:** ±4% full-scale

**Repeatability:** ±1% full-scale

**Turndown ratio:** 10:1

**Max pressure:** 100 psig (6.9 bar)

**Operating temp:**

32 to 150°F (0 to 65°C)

**Connections:** 1/8" NPT(F)

**Dimensions**

Fitting-to-fitting: 3" (7.6 cm)  
Height: 4 13/16" (12.2 cm)

### Materials of Construction

Flow tube	Polycarbonate
Fittings	Stainless steel
O-rings	Viton®
Frame	Polycarbonate



32900-36

Flow range	Float <sup>†</sup>	Flowmeters without valve		Flowmeters with valve	
		Catalog number	Price	Catalog number	Price
<b>For liquids; English units</b>					
0.2 to 2.5 GPH	WC	<a href="#">TW-32900-02</a>		<a href="#">TW-32900-28</a>	
1 to 10 GPH	BG	<a href="#">TW-32900-04</a>		<a href="#">TW-32900-30</a>	
4 to 40 GPH	SS	<a href="#">TW-32900-06</a>		<a href="#">TW-32900-32</a>	
<b>For liquids; metric units</b>					
5 to 110 ccm	BG	<a href="#">TW-32900-08</a>		<a href="#">TW-32900-34</a>	
20 to 300 ccm	SS	<a href="#">TW-32900-10</a>		<a href="#">TW-32900-36</a>	
<b>For air; English units</b>					
0.2 to 2.5 scfh	SS	<a href="#">TW-32900-12</a>		<a href="#">TW-32900-38</a>	
1 to 11 scfh	BG	<a href="#">TW-32900-14</a>		<a href="#">TW-32900-40</a>	
4 to 60 scfh	BG	<a href="#">TW-32900-16</a>		<a href="#">TW-32900-42</a>	
<b>For air; metric units</b>					
0.1 to 1.2 LPM	SS	<a href="#">TW-32900-18</a>		<a href="#">TW-32900-44</a>	
0.4 to 5 LPM	BG	<a href="#">TW-32900-20</a>		<a href="#">TW-32900-46</a>	
1 to 10 LPM	SS	<a href="#">TW-32900-22</a>		<a href="#">TW-32900-48</a>	
4 to 50 LPM	SS	<a href="#">TW-32900-24</a>		<a href="#">TW-32900-52</a>	
10 to 100 LPM	TC	<a href="#">TW-32900-26</a>		<a href="#">TW-32900-54</a>	

<sup>†</sup>Float material key: WC = white ceramic, BG = black glass, SS = stainless steel, TC = tungsten carbide





## Pitot Tube-Style Flowmeter

### Unique design allows wide viewing angles for easier reading

- Easily serviceable
- Dual-scale flow units—GPM and LPM

Pitot tube-style flowmeters are designed to measure water flow rates in closed horizontal PVC water pipe systems, such as swimming pool, spa, aquaculture, and horticulture applications, ensuring the recirculation pump is flowing adequate water for optimal water filtration. These flowmeters are compatible with existing flowmeter installations at an economical price, and can replace more expensive paddle wheel flowmeter systems when only local indication is required.

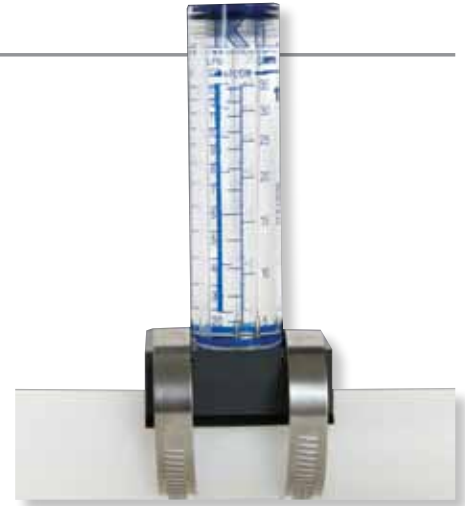
Flowmeter body is machined from a single acrylic piece, and clamps directly onto Schedule 40 PVC pipe with included gasket. Made from all corrosion-resistant materials, these meters are designed for indoor or outdoor use.

**What's included:** Viton® gasket and two stainless steel (SS) clamps.

### Specifications

**Accuracy:** ±10% full-scale  
**Media type:** water  
**Max pressure:** 150 psi (10.3 bar)

**Operating temp:** 32 to 150°F (0 to 65°C)  
**Dimensions:** 5¼"H (13.3 cm) (top of meter to pipe)



32900-82

### Materials of Construction

Flow tube	Acrylic
Seals	Viton®
Mounting base	PVC
Top plug	PVC

Catalog number	Flow range		Pipe size	Float	Price
	GPM	LPM			
<a href="#">TW-32900-82</a>	5 to 35	20 to 130	1¼"	316 SS	
<a href="#">TW-32900-84</a>	10 to 60	40 to 220	1¼"	316 SS	
<a href="#">TW-32900-86</a>	5 to 30	20 to 110	1½"	Black acrylic	
<a href="#">TW-32900-88</a>	20 to 100	75 to 375	1½"	316 SS	
<a href="#">TW-32900-90</a>	40 to 130	150 to 500	2"	316 SS	

## Technical Support



*Our team of experts  
is here to help you*

**Cole-Parmer®**  
Delivering Solutions You Trust

## Pocket Flowmeters

### Perfect for quick flow readings of tubing

- Reads 3/16" to 7/16" ID tubing size
- Polycarbonate flow tube
- Stainless steel float

Portable handheld flowmeters are designed to measure flow rates quickly and easily. Measure oxygen or air in the lab, field, or in process areas. Simply attach the flowmeter to tubing vertically to ensure accurate readings. Read center of ball float for the most accurate reading.



32500-82

### Specifications

**Accuracy**  
 ½ to 4 LPM: ±0.2 LPM  
 4 to 8 LPM: ±0.4 LPM  
 8 to 15 LPM: ±0.6 LPM

**Max pressure:** 100 psi (6.9 bar)  
**Mounting angle:** vertical  
**Flow conditions:** atmosphere  
**Dimensions (L x dia):** 5¼" x ½" (13.3 x 1.3 cm)  
**Fits tubing size:** 3/16" to 7/16" ID

### Materials of construction

Flow tube	Polycarbonate
Float	Stainless steel
Fittings	Acrylic



Flow range (LPM)	For oxygen		For air	
	Catalog number	Price	Catalog number	Price
½ to 2½	<a href="#">TW-32500-80</a>		—	—
1 to 8	<a href="#">TW-32500-82</a>		<a href="#">TW-32500-86</a>	
2 to 15	<a href="#">TW-32500-84</a>		<a href="#">TW-32500-88</a>	



# Flowmeters

## Variable Area, Direct Reading

### Easy-View Acrylic In-Line Flowmeters

#### Highly durable meters provide an unobstructed 360° view

- Flow ranges up to 50 GPM (200 LPM) with dual-unit scales for flexibility
- Machined from high-quality acrylic rod stock—extremely durable
- The one-piece, in-line body consumes less space for a clean installation

These meters are designed for use in more aggressive process environments. In addition to the machined acrylic bodies, the design utilizes SS float guides. The combination is a meter suitable for high-vibration, high-fluctuation process applications. Some versions include polypropylene end fittings reinforced with aluminum stress rings for added strength to the meters' design.

Models for liquids have direct-reading scales in English and metric units; models for air have direct-reading scales in English.

#### Specifications for all flowmeters



- Accuracy:** ±5% of reading
- Max pressure:** 150 psi (10.3 bar);  
130 psig (8.8 bar) for large-body models
- Max operating temp:** 150°F (65°C);  
130°F (54°C) for large-body models

- Dimensions (H x dia)**
- Models with flow rates up to 5 GPM and 45 scfm air:  
8<sup>3</sup>/<sub>16</sub>" x 1<sup>1</sup>/<sub>4</sub>" (20.8 x 3.2 cm)
- Models with flow rates from 10 to 20 GPM: 11" x 1<sup>3</sup>/<sub>4</sub>"  
(27.9 x 4.4 cm)
- Large-body models:  
12" x 2" (30.5 x 5.1 cm)

#### Materials of Construction

Part	General-purpose	Large-body	Corrosive environment with alarm
Body	Acrylic		
Fittings	PP†	PVC	PVC
O-rings	Viton®		
Guide	316 SS	Hastelloy	

†Reinforced with aluminum stress rings.



General-purpose flowmeter for liquids 32477-26

General-purpose flowmeter with alarm 32477-50

Large-body flowmeter for liquids 32477-82

### General-Purpose Flowmeters

Cat. no.	Flow range	Float	Connections	Price
<b>For liquids</b>				
<a href="#">TW-32477-00</a> <a href="#">TW-32477-02</a>	0.025 to 0.25 GPM/0.1 to 1 LPM	PVC	1/4" NPT(F) 3/8" NPT(F)	
<a href="#">TW-32477-04</a> <a href="#">TW-32477-06</a>	0.1 to 1 GPM/0.4 to 4 LPM	PVC	3/8" NPT(F) 1/2" NPT(F)	
<a href="#">TW-32477-08</a> <a href="#">TW-32477-10</a>	0.2 to 2 GPM/1 to 7.5 LPM	316 SS	3/8" NPT(F) 1/2" NPT(F)	
<a href="#">TW-32477-12</a> <a href="#">TW-32477-14</a>	0.3 to 3 GPM/1.5 to 11.1 LPM	316 SS	3/8" NPT(F) 1/2" NPT(F)	
<a href="#">TW-32477-16</a> <a href="#">TW-32477-18</a>	0.5 to 5 GPM/2.0 to 20 LPM	316 SS	3/8" NPT(F) 1/2" NPT(F)	
<a href="#">TW-32477-20</a> <a href="#">TW-32477-22</a>	1 to 10 GPM/4 to 38 LPM	316 SS	3/4" NPT(F) 1" NPT(F)	
<a href="#">TW-32477-24</a> <a href="#">TW-32477-26</a>	1 to 17 GPM/4 to 64 LPM	316 SS	3/4" NPT(F) 1" NPT(F)	
<a href="#">TW-32477-28</a> <a href="#">TW-32477-30</a>	2 to 20 GPM/8 to 80 LPM	316 SS	3/4" NPT(F) 1" NPT(F)	
<b>For air</b>				
<a href="#">TW-32477-70</a> <a href="#">TW-32477-72</a>	0.75 to 7.5 scfm	316 SS	3/8" NPT (F) 1/2" NPT (F)	
<a href="#">TW-32477-74</a> <a href="#">TW-32477-76</a>	4.0 to 45 scfm	316 SS	3/4" NPT (F) 1" NPT (F)	

### Large-Body Flowmeters

Cat. no.	Flow range	Float	Connections	Price
<b>For liquids</b>				
<a href="#">TW-32477-78</a> <a href="#">TW-32477-80</a> <a href="#">TW-32477-82</a>	5 to 25 GPM (20 to 100 LPM) 8 to 40 GPM (30 to 150 LPM) 10 to 50 GPM (40 to 200 LPM)	316 SS	1 1/2" NPT (M)	

### Flowmeters with High/Low Alarms

Catalog number	Flow range		Float	Connection	Price
	GPM	LPM			
<b>General purpose flowmeters for liquids</b>					
<a href="#">TW-32477-34</a> <a href="#">TW-32477-36</a>	0.2 to 2.0	1 to 7.5	PVC	3/4" NPT(F) 1" NPT(F)	
<a href="#">TW-32477-50</a> <a href="#">TW-32477-52</a>	0.5 to 5.0	2 to 20			
<a href="#">TW-32477-38</a> <a href="#">TW-32477-40</a>	1 to 10	4 to 38	316 SS	3/4" NPT(F) 1" NPT(F)	
<a href="#">TW-32477-54</a> <a href="#">TW-32477-56</a>	2 to 20	8 to 80			
<b>Corrosive-environment flowmeters for liquids</b>					
<a href="#">TW-32477-42</a> <a href="#">TW-32477-44</a>	1 to 10	4 to 38	Hastelloy	3/4" NPT(F) 1" NPT(F)	
<a href="#">TW-32477-46</a> <a href="#">TW-32477-48</a>	1 to 17	4 to 64			
<a href="#">TW-32477-58</a> <a href="#">TW-32477-60</a>	2 to 20	8 to 80			



Ensure the accuracy of your flowmeter!

- [TW-17080-00](#) NIST-traceable calibration with data for air/gas flowmeter
- [TW-17080-12](#) NIST-traceable calibration with data for liquid flowmeter



## Polysulfone In-Line Flowmeters

### Better than acrylics for aggressive fluids or high temperature and pressure applications

- Flow ranges from less than 0.1 GPM to over 130 GPM and less than 1 scfm to over 230 scfm
- Models with all plastic wetted parts are ideal for ultrapure and deionized water applications

All meters include union connections—installing the meter and cleaning the internals is much easier. The unions also allow simple rotation of the sight-tube for easier reading all while keeping a tight thread seal on the fittings to contain aggressive fluids. With an O-ring seal, a tight seal is assured with O-ring replacement.

Most meters feature dual scales (English and metric) to reduce the need for stocking separate units for shipping to the US or elsewhere. The back-side of the meter body is molded with an opaque surface to make reading easier.

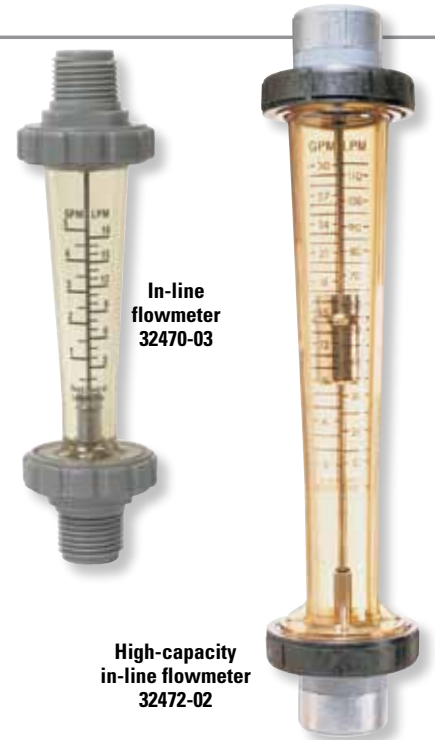
**Note:** Polysulfone is not suited for direct exposure to sunlight.

### Specifications for all flowmeters

#### Accuracy

- Standard in-line and panel mount: ±5% full-scale
- High-capacity: ±3% full-scale
- Ultrapure: ±2½% full-scale

**Max pressure drop:** 2 psi (0.1 bar)



In-line flowmeter 32470-03

High-capacity in-line flowmeter 32472-02

### In-Line Flowmeters

This design is the standard and fits well into the piping line for confined or high-traffic areas.

Catalog number	Flow range	Float material	Connections	Dimensions (L x dia)	Maximum temp/pressure	Price
<b>Standard in-line flowmeters for water</b>						
TW-32470-00	0.025 to 0.25 GPM/0.1 to 1.0 LPM	PVC	½" NPT(M)	6¾" x 1½"	212°F/150 psig	
TW-32470-01	0.1 to 1.0 GPM/0.4 to 4.0 LPM	316 SS				
TW-32470-02	0.2 to 2.0 GPM/0.75 to 7.5 LPM	316 SS				
TW-32470-03	0.5 to 5.0 GPM/1.8 to 18 LPM	316 SS				
TW-32470-04	1.0 to 10.0 GPM/5.0 to 37.5 LPM	316 SS	¾" NPT(M)	7½" x 2"		
<b>Standard in-line flowmeters for air</b>						
TW-32470-05	1 to 12 scfm	316 SS	½" NPT(M)	8¾" x 2"	212°F/150 psig	
TW-32470-06	4 to 48 scfm		¾" NPT(M)	10" x 2"		
<b>High-capacity in-line flowmeters for water</b>						
TW-32472-00	1.0 to 10 GPM/3.0 to 38 LPM	316 SS	1" NPT(F)	14½" x 3½"	212°F/150 psig	
TW-32472-01	2.0 to 20 GPM/7.5 to 75 LPM					
TW-32472-02	3.0 to 30 GPM/12 to 115 LPM					
TW-32472-03	4.0 to 40 GPM/15 to 155 LPM		2" NPT(F)	18¾" x 4¾"	150°F/130 psig	
TW-32473-01	6.0 to 60 GPM/30 to 230 LPM					
TW-32473-02	10 to 80 GPM/40 to 300 LPM					
TW-32473-04	15 to 130 GPM/60 to 500 LPM					
<b>High-capacity in-line flowmeters for air</b>						
TW-32473-10	8 to 80 scfm	316 SS	1" NPT(F)	14½" x 3½"	212°F/150 psig	
TW-32473-11	30 to 230 scfm		2" NPT(F)	18¾" x 4¾"		

### Ultrapure In-Line Flowmeters for Liquids

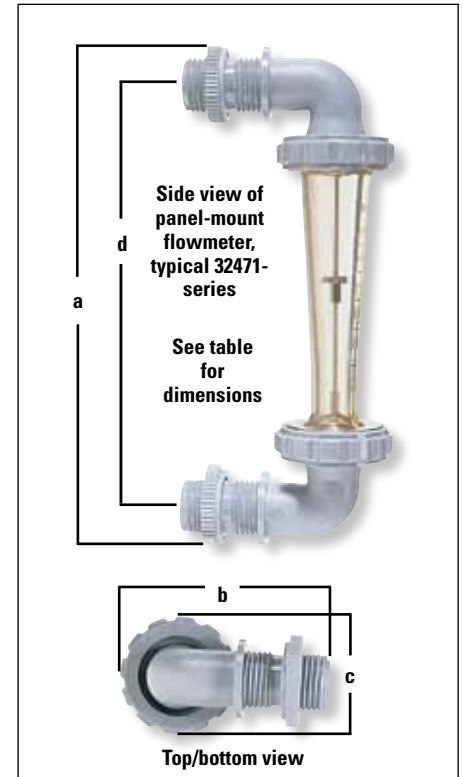
These designs use a fluted meter body instead of a metallic float guide as in the other units. There is no metal in the fluid path with these meters.

Catalog number	Flow range	Float material	Connections	Dimensions (L x dia)	Maximum temp/pressure	Price
TW-32475-10	0.1 to 1.2 GPM/0.4 to 4.4 LPM	PTFE	½" NPT(F)	10" x 1¾"	130°F/150 psig	
TW-32475-14	0.2 to 2.0 GPM/0.3 to 8.0 LPM					
TW-32475-22	0.5 to 5.0 GPM/2.0 to 20 LPM					

### Panel-Mount Flowmeters

Meters include 90° PVC elbow fittings for panel mounting. Models for air include a valve for control of inlet flow into meter; call your dealer for lower cost air models without a valve.

Catalog number	Flow rate	Float material	Connections	Dimensions (a x b x c, d)	Maximum temp/press	Price
<b>Panel-mount flowmeters for water</b>						
TW-32471-00	0.025 to 0.250 GPM/0.1 to 1.0 LPM	PVC	½" NPT(M)	7" x 4½" x 1½", 6"	212°F/150 psig	
TW-32471-01	0.1 to 1.0 GPM/0.4 to 4.0 LPM	316 SS				
TW-32471-02	0.2 to 2.0 GPM/0.75 to 7.5 LPM					
TW-32471-03	0.5 to 5.0 GPM/1.8 to 18 LPM					
TW-32471-04	1.0 to 10.0 GPM/5.0 to 37.5 LPM	316 SS	¾" NPT(M)	8" x 4½" x 2", 6¾"		
<b>Panel-mount flowmeters for air</b>						
TW-32471-05	1 to 12 scfm	316 SS	½" NPT(M)	9¾" x 3¾" x 2", 8¾"	212°F/150 psig	
TW-32471-06	4 to 48 scfm		¾" NPT(M)	10½" x 3¾" x 2", 9¾"		



Side view of panel-mount flowmeter, typical 32471-series

See table for dimensions

Top/bottom view

### MORE online!

For pressure drop information for these flowmeters, go to ...

[ColeParmer.com](http://ColeParmer.com)



# Flowmeters

## Variable Area, Direct Reading

### Cole-Parmer Flowmeters with Pressure-Compensating Scales

#### Install in any position

Use for high-pressure industrial applications—install in any configuration, even next to a bend in your pipeline. A calibrated retention spring eliminates the need to mount flowmeters vertically or run straight lengths of pipe prior to or after the meter. These rugged flowmeters are relatively insensitive to shock and vibrations—the spring, piston assembly, and internal magnet compensate for rough process environments.

#### Specifications

**Accuracy:** ±2% full-scale  
**Repeatability:** ±1%  
**Max operating temp:** 240°F (115°C)

**Max pressure**  
 Aluminum models (gas): 1000 psi (68.9 bar)  
 Brass models (liquid): 3500 psi (241.3 bar)  
 Stainless steel models (liquid): 6000 psi (413.6 bar)  
 up to ½" NPT(F); 5000 psi (344.7 bar) up to 1" NPT(F)



#### Materials of Construction

Part	Aluminum	Brass	Stainless steel (SS)
Body	Aluminum	Brass	303 SS
Piston/cone	Aluminum	Brass	303 SS
Fittings	Anodized aluminum	Brass	303 SS
Spring		302 SS	
Magnet		PPS ceramic	
Seals		Viton®	



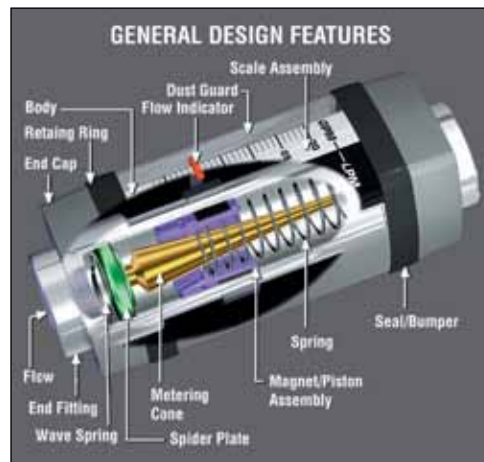
Graph-style aluminum flowmeter 32206-26

Dual-scale SS flowmeter 32205-12

#### Graph-Style Aluminum Flowmeters for Air

Graph-style flowmeters for air are ideal for applications with changing pressures—eliminating the need for calculating correction factors. Flowmeters with built-in pressure gauge allow measurement of inlet pressure, which is necessary to properly read the scale graph. Aluminum construction.

Flow range <sup>†</sup> Air (scfm)	Connections	Dimensions (W x H x D)	Graph-style flowmeters		Graph-style flowmeters with built-in pressure gauge	
			Catalog number	Price	Catalog number	Price
0.5 to 5 1 to 10 2 to 20 3 to 30	¼" NPT(F)	1¾" x 4 <sup>13</sup> / <sub>16</sub> " x 1 <sup>15</sup> / <sub>16</sub> " (4.4 x 12.2 x 5.0 cm)	<a href="#">TW-32206-02</a>		<a href="#">TW-32206-52</a>	
			<a href="#">TW-32206-04</a>		<a href="#">TW-32206-54</a>	
			<a href="#">TW-32206-06</a>		<a href="#">TW-32206-56</a>	
			<a href="#">TW-32206-08</a>			—
3 to 25 5 to 50 10 to 100 15 to 150	½" NPT(F)	2½" x 6 <sup>5</sup> / <sub>16</sub> " x 2 <sup>7</sup> / <sub>16</sub> " (5.4 x 16.8 x 6.2 cm)	<a href="#">TW-32206-12</a>		<a href="#">TW-32206-62</a>	
			<a href="#">TW-32206-14</a>		<a href="#">TW-32206-64</a>	
			<a href="#">TW-32206-16</a>		<a href="#">TW-32206-66</a>	
				—	<a href="#">TW-32206-68</a>	
10 to 100 15 to 150 25 to 250	¾" NPT(F)	2½" x 7 <sup>3</sup> / <sub>16</sub> " x 2 <sup>15</sup> / <sub>16</sub> " (6.4 x 18.2 x 7.5 cm)	<a href="#">TW-32206-20</a>		<a href="#">TW-32206-70</a>	
				—	<a href="#">TW-32206-72</a>	
			<a href="#">TW-32206-24</a>		<a href="#">TW-32206-74</a>	
				—		
25 to 250	1" NPT(F)	2½" x 7 <sup>3</sup> / <sub>16</sub> " x 2 <sup>15</sup> / <sub>16</sub> " (6.4 x 18.2 x 7.5 cm)	<a href="#">TW-32206-26</a>		<a href="#">TW-32206-76</a>	



#### Dual-Scale Brass and Stainless Steel Flowmeters for Water

Dual-scale flowmeters indicate gallons and liters simultaneously with an easy-to-read linear scale and highly visible red indicator. Available in brass or stainless steel construction.

Flow range <sup>†</sup> Water		Connections	Dimensions (W x H x D)	Brass flowmeters		303 stainless steel flowmeters	
GPM	LPM			Cat. no.	Price	Cat. no.	Price
0.1 to 1.0 0.2 to 2.0	0.4 to 4 1 to 7.5	¼" NPT(F)	1¾" x 4 <sup>13</sup> / <sub>16</sub> " x 1 <sup>15</sup> / <sub>16</sub> " (4.4 x 12.2 x 5.0 cm)	<a href="#">TW-32204-04</a>		<a href="#">TW-32205-04</a>	
				<a href="#">TW-32204-06</a>		<a href="#">TW-32205-06</a>	
0.2 to 2.0 0.5 to 5.0 1 to 15 1 to 10	1 to 7.5 1.8 to 18 4 to 56 4 to 37	½" NPT(F)	2½" x 6 <sup>5</sup> / <sub>16</sub> " x 2 <sup>7</sup> / <sub>16</sub> " (5.4 x 16.8 x 6.2 cm)	<a href="#">TW-32204-08</a>		<a href="#">TW-32205-08</a>	
				<a href="#">TW-32204-10</a>		<a href="#">TW-32205-10</a>	
				<a href="#">TW-32204-12</a>		<a href="#">TW-32205-12</a>	
				<a href="#">TW-32204-14</a>		<a href="#">TW-32205-14</a>	
2 to 20 3 to 30 1 to 10	7.5 to 75 11 to 113 4 to 37	¾" NPT(F)	2½" x 7 <sup>3</sup> / <sub>16</sub> " x 2 <sup>15</sup> / <sub>16</sub> " (6.4 x 18.2 x 7.5 cm)	<a href="#">TW-32204-16</a>			—
				<a href="#">TW-32204-18</a>			—
				<a href="#">TW-32204-20</a>		<a href="#">TW-32205-20</a>	
				<a href="#">TW-32204-22</a>		<a href="#">TW-32205-22</a>	
2 to 20 4 to 40	7.5 to 75 11 to 151	1" NPT(F)	2½" x 7 <sup>3</sup> / <sub>16</sub> " x 2 <sup>15</sup> / <sub>16</sub> " (6.4 x 18.2 x 7.5 cm)	<a href="#">TW-32204-24</a>			—
					—		—

<sup>†</sup>Flow given at 70°F and 100 psi.

**INNOCAL®**  
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**Ensure the accuracy of your flowmeter!**

[TW-17080-00](#) NIST-traceable calibration with data for air/gas flowmeter  
[TW-17080-12](#) NIST-traceable calibration with data for liquid flowmeter



**Cole-Parmer® Economical Spring-Loaded Flowmeters**

**Perfect low-cost durable process meter**

- Spring-loaded indicator allows inline mounting in any position
- Nonreactive wetted parts are ideal for applications requiring a high level of purity
- Direct reading in dual English and metric scales
- Versions available with electric switches—field adjustable to trigger high/low alarms or other control devices

Spring-loaded, no-float design means these versatile, economical flowmeters do not depend on gravity for accurate readings. Mount in any position in your flow line. Straight pipe runs are not required before or after the flowmeter. Pressure drop is only 4 psi full scale. Flowmeters feature a knife-edged piston that remains visible and easy to read even through cloudy liquids. Working parts are easily removed for maintenance.

**Flowmeters for Water, Air, or Nitrogen** are ideal for general water and air applications, including process water and cooling water lines. Flowmeters feature direct reading scales for water in GPM and LPM, as well as for air (at 90 psi) in scfm and SLPM.

**Flowmeters for Ultrapure Water** are perfect for pharmaceutical and laboratory applications using ultra-pure, distilled, deionized, or demineralized water. Use these flowmeters to indicate flow rate to deionized water returns and UPW returns.

**Flowmeters with Electric Switches** allow for critical set point monitoring. They are field adjustable to activate high/low alarms or other control devices via a proximity switch in the housing which is actuated by the moving piston.

**Note:** Polysulfone is not suited for direct contact with sunlight.



**Flowmeter for water, air, or nitrogen 32211-54**

Adjustable switch versions allow you to monitor critical flow points.



**Flowmeter for ultrapure water 32213-10**

**Specifications**

**Accuracy:** ±5% full-scale flow

**Repeatability:** ±5% of reading

**Pressure drop:** 4 psi (0.2 bar) at full scale flow

**Max pressure:** 250 psig (17.2 bar) liquids; 125 psig (8.6 bar) gases

**Max operating temp:** 230°F (110°C)

**Dimensions**

Models with max flow rates up to 15 GPM  
Without switch (H x dia): 7" x 2" (17.8 x 5.1 cm)  
With switch (W x H x D): 2" x 7" x 3 3/8" (5.1 x 17.8 x 9.8 cm)  
Models with max flow rates from 20 to 50 GPM  
Without switch (H x dia): 7" x 3" (17.8 x 7.6 cm)  
With switch (W x H x D): 3" x 7" x 4 1/2" (7.6 x 17.8 x 11.4 cm)

**Switch** (for appropriate models): three-wire Reed switch, contacts rated at 120 VAC/100 VDC, 300 mA

**Materials of Construction**

Part	Materials of Construction	
	For water, air, or nitrogen	Ultrapure water design
Body	Polysulfone	
Fittings	Brass	316 SS
O-rings	Viton®	
Spring	316 SS	
Shaft	Viton®	



Maximum flow rate				Connections	For water, air, or nitrogen				For ultrapure water only	
Water		Air†			Flowmeters without switch		Flowmeters with switch		Flowmeters without switch	
GPM	LPM	scfm	SLPM		Catalog number	Price	Catalog number	Price	Catalog number	Price
5	20	50	1400	1/2" NPT(F) 1" NPT(F)	<a href="#">TW-32211-00</a> <a href="#">TW-32211-02</a>		<a href="#">TW-32211-50</a> <a href="#">TW-32211-52</a>		<a href="#">TW-32213-00</a> <a href="#">TW-32213-02</a>	
10	38	90	2500	1/2" NPT(F) 1" NPT(F)	<a href="#">TW-32211-04</a> <a href="#">TW-32211-06</a>		<a href="#">TW-32211-54</a> <a href="#">TW-32211-56</a>		— —	— —
15	55	135	3900	1/2" NPT(F) 1" NPT(F)	<a href="#">TW-32211-08</a> <a href="#">TW-32211-10</a>		<a href="#">TW-32211-58</a> <a href="#">TW-32211-60</a>		— <a href="#">TW-32213-10</a>	— —
20	75	200	5500	1" NPT(F) 1 1/2" NPT(F)	<a href="#">TW-32211-12</a> <a href="#">TW-32211-14</a>		<a href="#">TW-32211-62</a> —	— —	— —	— —
30	110	300	6000	1" NPT(F) 1 1/2" NPT(F)	<a href="#">TW-32211-16</a> <a href="#">TW-32211-18</a>		<a href="#">TW-32211-66</a> <a href="#">TW-32211-68</a>		— <a href="#">TW-32213-18</a>	— —
40	150	400	11,000	1" NPT(F) 1 1/2" NPT(F)	<a href="#">TW-32211-20</a> <a href="#">TW-32211-22</a>		— <a href="#">TW-32211-72</a>	— —	— <a href="#">TW-32213-22</a>	— —
50	200	500	14,000	1" NPT(F) 1 1/2" NPT(F)	<a href="#">TW-32211-24</a> <a href="#">TW-32211-26</a>		— <a href="#">TW-32211-76</a>	— —	<a href="#">TW-32213-24</a> <a href="#">TW-32213-26</a>	— —

†Only models 32211-series measure air at 90 psi and 70°F.

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[TW-17080-00](#) NIST-traceable calibration with data for air/gas flowmeter  
[TW-17080-12](#) NIST-traceable calibration with data for liquid flowmeter



# Flowmeters

## Variable Area, Direct Reading

### Cole-Parmer Stainless Steel Shielded Flowmeters

#### For the most aggressive process applications

- Flowmeters enclosed in brushed 304 SS case
- Ideal for applications with flow rates up to 116 GPM and 250 scfm

Detachable, clear 3/16"-thick polycarbonate front shield provides protection at maximum rated temperature and pressure. Easily read the graduated direct-reading scale. The interchangeable transparent scale plates mount directly on the front of the flowtube.

Unique float stops allow easy cleaning—remove and replace the float without disturbing either the flowtube or the shield. Tube sizes 3, 4, and 5 are fluted; tube sizes 6, 8, and 9 are tapered with a stainless steel guide rod.

#### Specifications

**Accuracy:** ±3% full-scale  
**Repeatability:** ±0.5% full-scale  
**Minimum flow rate:** approx 10% of max flow rate (see table below)

**Max pressure:** (at 200°F)  
 Tube sizes 3, 4, 5, and 6: 200 psi (13.7 bar)  
 Tube sizes 8, and 9: 125 psi (8.6 bar)

**Max operating temp:** 200°F (93°C)



#### Materials of Construction

Flowtube	Borosilicate glass
Fittings	316 SS
O-rings	Viton®
Float, rod	316 SS
Shield	Polycarbonate



Catalog number	Max flow rate		Float type <sup>†</sup>	Tube size	Pressure drop (" of H <sub>2</sub> O)	Connections	Dimensions (W x H x D)	Price
	Water (GPM)	Air (scfm)						
TW-32447-00	0.25	1.0	LP		—			
TW-32447-02	0.36	1.5	SL	3	2	1/2" NPT(F)	2 1/2" x 1 1/8" x 2 9/16" (6.4 x 30.2 x 6.5 cm)	
TW-32447-10	0.74	3.0	SL	3	5			
TW-32447-20	1.0	4.2	LP	4	6		2 1/2" x 1 1/8" x 2 9/16" (6.4 x 30.2 x 6.5 cm)	
TW-32447-32	1.5	6.0	LP	5	—	1/2" NPT(F)	3 3/8" x 1 3/4" x 3 7/8" (8.6 x 34.9 x 9.8 cm)	
TW-32447-30	2.0	8.2	SL	4	10		2 1/2" x 1 1/8" x 2 9/16" (6.4 x 30.2 x 6.5 cm)	
TW-32447-34	3.8	16	GS	5	10			
TW-32447-40	5.0	21.5	SL	5	14	1" NPT(F)	3 3/8" x 1 3/4" x 3 7/8" (8.6 x 34.9 x 9.8 cm)	
TW-32447-42	6.0	25.5	GV	6	5			
TW-32447-50	9.6	40	GS	5	10			
TW-32447-52	11	45	GS	6	13	1" NPT(F)	3 3/8" x 1 3/4" x 3 7/8" (8.6 x 34.9 x 9.8 cm)	
TW-32447-54	14	62	GS	6	24	1" NPT(F)	3 3/8" x 1 3/4" x 3 7/8" (8.6 x 34.9 x 9.8 cm)	
TW-32447-60	20	90	SL	6	39	1" NPT(F)	3 3/8" x 1 3/4" x 3 7/8" (8.6 x 34.9 x 9.8 cm)	
TW-32447-62	26	— <sup>‡</sup>	SL	6	70	1" NPT(F)	3 3/8" x 1 3/4" x 3 7/8" (8.6 x 34.9 x 9.8 cm)	
TW-32447-74	41	160	GV	9	5	2" NPT(F)	5 1/16" x 1 6" x 5 5/8" (13.5 x 40.6 x 13.6 cm)	
TW-32447-80	60	245	GS	9	16		5 1/16" x 1 6" x 5 5/8" (13.5 x 40.6 x 13.6 cm)	
TW-32447-82	86	— <sup>‡</sup>	SL	9	25	2" NPT(F)		

<sup>†</sup>LP floats have the lowest pressure loss, GV floats are accurate at higher viscosities, GS floats are accurate at lower viscosities than GV and have a higher flow rate, SL floats have the highest flow rate. <sup>‡</sup>Flowmeters are for direct reading of water only.

### Spring-Loaded In-Line Flowmeters

#### Provide accurate readings while mounted in any position

- Rugged design resists shock and vibration
- Control pumps or valves with an optional limit switch

These economical flowmeters are built with a spring-retained piston for direct, accurate readings regardless of the position you mount them. Use them to monitor hydraulic systems or chemical processes; the meters also work well to check pump and control valve performance.

**Note:** Polysulfone is not suited for direct contact with sunlight.

#### Specifications

**Accuracy:** ±5% full scale  
**Repeatability:** ±1%  
**Max pressure:** 325 psi (22.4 bar)  
**Max operating temp:** 250°F (121°C)

**Dimensions**  
 1/2" units: 7.75" (197 mm) L  
 3/4" units: 8.25" (210 mm) L  
 1" units: 5.25" (134 mm) L

#### Materials of Construction

Part	1/2" units	3/4" & 1" units
Body	Polysulfone	
Fittings	Brass	Polysulfone
Indicator ring/seals	Buna N	
Spring	316 stainless steel	



Flowmeter 03231-81 shown with limit switch 03231-80

Flowmeter 03231-41

Flow range		Pressure drop	Water, 1/2" NPT(F) <sup>†</sup>		Water, 3/4" NPT(M) <sup>†</sup>		Water, 1" NPT(M) <sup>†</sup>		Oil, 1" NPT(M) <sup>‡</sup>	
US units	Metric units		Cat. no.	Price	Cat. no.	Price	Cat. no.	Price	Cat. no.	Price
0.5 to 4 GPM	2 to 15 LPM	1 psid at 3 GPM	TW-03231-01		TW-03231-21		TW-03231-41		TW-03231-61	
1 to 7 GPM	4 to 26 LPM	2 psid at 6 GPM	TW-03231-03		TW-03231-23		TW-03231-43		—	—
1 to 10 GPM	4 to 35 LPM	3 psid at 9 GPM	TW-03231-07		TW-03231-27		TW-03231-45		—	—
1 to 16 GPM	5 to 60 LPM	7.5 psid at 12 GPM	TW-03231-09		TW-03231-29		TW-03231-47		TW-03231-67	
4 to 28 GPM	20 to 100 LPM	7 psid at 21 GPM	—	—	TW-03231-33		TW-03231-51		TW-03231-71	

<sup>†</sup>Water flowmeters are calibrated for specific gravity = 1.00. <sup>‡</sup>Oil flowmeters are calibrated for specific gravity = 0.876.

**Limit switches.** Use to provide an output signal at a setpoint anywhere between 0 to 100% of full-scale. Use to control small pumps, valves, or alarms or to interface with a PLC.

**TW-03231-80 AC switch;** 115 VAC ±10%; 0.5 A max  
**TW-03231-85 DC switch;** 10 to 30 VDC, 1 A max



**Cole-Parmer Dual-Media Flowmeters with Dual Scale**

Highly flexible design allows a single meter to be used in numerous applications

- Rotate the flow tube to select water or air scale in either English or metric units
- In-line and panel-mount options to suit most system designs
- Ideal for busy process areas—heavy-walled flowtube with metal housing

**Specifications**

**Accuracy:** ±5% full-scale  
**Max pressure:** 150 psi (10.3 bar) at 200°F (93°C)  
**Max operating temp:** 250°F (121°C)  
**Connections:** 3/8" NPT(F)

**Dimensions**  
 In-line (W x H): 2" x 13 1/4" (5.1 x 33.7 cm)  
 Panel-mount (W x H x D): 2" x 10 3/8" x 1 7/8" (5.1 x 26.3 x 4.7 cm); valve protrudes 1 1/2" (3.8 cm) from face. Space between inlet and outlet is 9" (22.9 cm)

**Materials of Construction**

Part	Brass	316 SS
Flowtube	Borosilicate glass	
Fittings, valves	Brass	316 SS
O-rings	Viton®	
Float	316 SS	
Frame	Aluminum	



Panel-mount 32062-30

In-line 32060-02



Rotate scale around flowtube to select water or air scale.

Maximum flow rate				Flowmeters without valve				Flowmeters with valve			
Water		Air		Brass fittings		316 SS fittings		Brass fittings		316 SS fittings	
GPM	LPM	scfm	LPM	Cat. no.	Price	Cat. no.	Price	Cat. no.	Price	Cat. no.	Price
<b>In-line flowmeters</b>											
1.2	4.0	5	140	—	—	TW-32061-00	—	TW-32060-10	—	TW-32061-10	—
2.0	8.0	10	280	TW-32060-01	—	TW-32061-01	—	TW-32060-11	—	TW-32061-11	—
3.0	11.5	15	425	TW-32060-02	—	—	—	—	—	TW-32061-12	—
4.0	15.0	20	575	—	—	—	—	TW-32060-13	—	TW-32061-13	—
5.0	20.0	30	900	—	—	—	—	—	—	TW-32061-14	—
<b>Panel-mount flowmeters</b>											
1.2	4.0	5	140	—	—	—	—	TW-32062-10	—	TW-32062-30	—
2.0	8.0	10	280	TW-32062-02	—	TW-32062-22	—	TW-32062-12	—	TW-32062-32	—
3.0	11.5	15	425	—	—	—	—	TW-32062-14	—	—	—
4.0	15.0	20	575	—	—	—	—	TW-32062-16	—	TW-32062-36	—

**Cole-Parmer Dual-Media PTFE Flowmeters with Dual Scale**

Use one of these safe-design meters in multiple aggressive chemical applications

- Scale rotates to display rates for either air-like or water-like fluids
- Breakaway back plate protects user in case of pressure surge blowout
- Valved units offer both control and indication of flowrate

These meters have been designed to measure aggressive water-like liquid solutions and aggressive air-like gas mixtures. The dual-scale for liquids measures in GPM and LPM; the dual-scale for gases shows flow rate in scfm and LPM.



32053-26

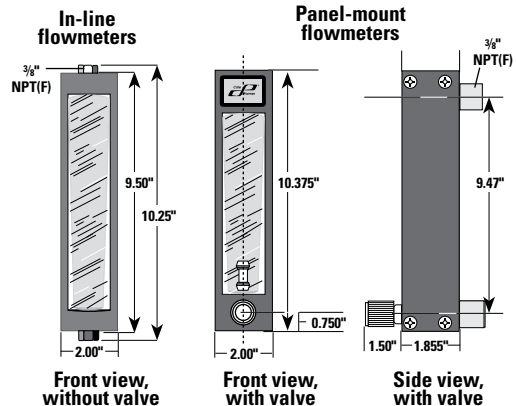
**Specifications**

**Accuracy:** ±5% full-scale  
**Max pressure:** 100 psi (6.9 bar)  
**Max operating temp:** 150°F (65°C)  
**Connections:** 3/8" NPT(F)  
**Leak integrity:** Each flowmeter is individually leak-tested to 1 x 10<sup>-7</sup> sccs of helium or better



**Materials of Construction**

Part	Material
Flowtube	Borosilicate glass
Fittings, valves	PTFE/PCTFE
O-rings	PTFE
Float	PTFE
Frame	Aluminum



Maximum flow rate				Flowmeters without valve		Flowmeters with valve	
Water		Air		Cat. no.	Price	Cat. no.	Price
GPM	LPM	scfm	LPM				
<b>In-line flowmeters</b>							
0.8	3.0	3.5	100	TW-32053-00	—	TW-32053-20	—
1.5	5.75	7.0	200	TW-32053-02	—	TW-32053-22	—
2.2	8.25	10.5	300	—	—	TW-32053-24	—
2.9	11.0	14.0	400	—	—	TW-32053-26	—
4.1	15.75	22.0	625	—	—	TW-32053-30	—
<b>Panel-mount flowmeters</b>							
0.8	3.0	3.5	100	—	—	TW-32053-60	—
1.5	5.75	7.0	200	—	—	TW-32053-62	—
2.2	8.25	10.5	300	TW-32053-44	—	TW-32053-64	—
4.1	15.75	22.5	625	—	—	TW-32053-70	—

TW-31320-11 Fitting; NPT(M) to compression adapter, PFA, 3/8"



# Flowmeters

## Variable Area, Direct Reading

### Cole-Parmer Panel-Mount Flowmeters

Many unique features make these the ideal economical flowmeters

- Front shield magnifies scale 16% for more accurate readings
- Fused ceramic scale for a precise, permanent measuring guide
- A vertical-tangential locator line for readings with hairline accuracy

**Aluminum** is economical and good for general use with noncorrosive gases and liquids. A 150-mesh inlet screen is included.

**Brass** is economical and good for use with water. A 150-mesh inlet screen is included.

**316 Stainless Steel (SS)** withstands higher temperatures and pressures and features excellent chemical compatibility. A 150-mesh inlet screen is included.

Valved meters have valves mounted at the inlet (bottom) of the flowmeters. This arrangement is typically used for positive pressure applications with liquids and gases. The valve can be reconfigured to mount at the outlet (top), often for vacuum applications.

#### Specifications

- Accuracy:** ±5% full-scale
- Repeatability:** ±0.25% full-scale
- Minimum flow rate:** approximately 10% of maximum flow rate (see tables on facing page)
- Max pressure:** 200 psi (13.7 bar)
- Operating temp:** -15 to 250°F (-26 to 121°C)
- Connections:** 1/8" NPT(F)



#### Materials of Construction

Part	Aluminum	Brass	316 SS
Flowtube	Borosilicate glass		
Fittings, valves	Aluminum	Chrome-plated brass	316 SS
O-rings	Buna N		Viton®
Float	Glass, 316 SS, carboloy, sapphire, or tantalum		
Frame	Aluminum, acrylic, polycarbonate		

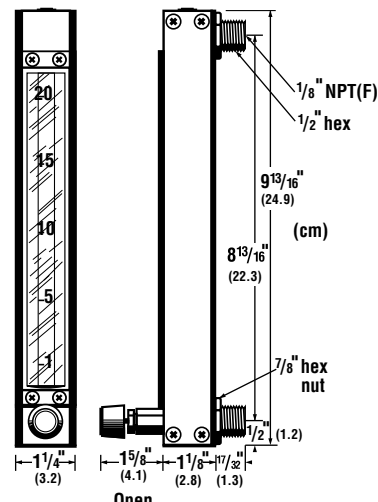
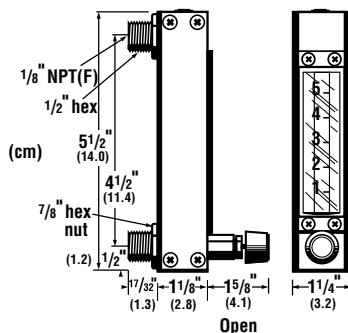


150-mm flowmeter  
32003-28  
with valve

65-mm flowmeter  
32012-29  
without valve

#### To Panel Mount

Drill two holes to fit the inlet and outlet according to the diagrams below. Secure flowmeter with two retaining nuts (included).



#### Tripod Bases

Bench mount up to three flowmeters in any combination. Three leveling screws and spirit level are built into a clear acrylic base.



Catalog number	Number of meters held	Price
TW-03226-10	One	
TW-03226-30	One, two, or three	





### 65-mm Direct Reading Flowmeters

Max flow	Float <sup>†</sup>	Flowmeters without valve						Flowmeters with valve					
		Aluminum fittings <sup>†</sup>		Brass fittings <sup>†</sup>		316 SS fittings <sup>†</sup>		Aluminum fittings <sup>†</sup>		Brass fittings <sup>†</sup>		316 SS fittings <sup>†</sup>	
		Cat. no.	Price	Cat. no.	Price	Cat. no.	Price	Cat. no.	Price	Cat. no.	Price	Cat. no.	Price
<b>For air</b>													
7 mL/min	G	TW-32010-15	—	—	—	—	TW-32012-15	—	—	TW-32013-15	—	—	TW-32015-15
50 mL/min	SS	TW-32010-01	—	—	TW-32011-01	—	TW-32012-01	—	—	TW-32013-01	—	—	TW-32015-01
100 mL/min	G	TW-32010-03	—	—	TW-32011-03	—	TW-32012-03	—	—	TW-32013-03	—	—	TW-32015-03
250 mL/min	C	TW-32010-05	—	—	—	—	TW-32012-05	—	—	TW-32013-05	—	—	TW-32015-05
500 mL/min	C	TW-32010-07	—	—	TW-32011-07	—	TW-32012-07	—	—	TW-32013-07	—	—	TW-32015-07
1.0 LPM	G	TW-32010-09	—	—	TW-32011-09	—	TW-32012-09	—	—	TW-32013-09	—	—	TW-32015-09
2.0 LPM	SS	TW-32010-11	—	—	TW-32011-11	—	TW-32012-11	—	—	TW-32013-11	—	—	TW-32015-11
5.0 LPM	G	TW-32010-13	—	—	TW-32011-13	—	TW-32012-13	—	—	TW-32013-13	—	—	TW-32015-13
10.0 LPM	SS	TW-32010-17	—	—	TW-32011-17	—	TW-32012-17	—	—	TW-32013-17	—	—	TW-32015-17
16.0 LPM	SS	TW-32010-16	—	—	TW-32011-16	—	TW-32012-16	—	—	TW-32013-16	—	—	TW-32015-16
2.2 scfh	G	—	—	—	TW-32011-18	—	TW-32012-18	—	—	TW-32013-18	—	—	TW-32015-18
6.0 scfh	G	—	—	—	—	—	TW-32012-19	—	—	TW-32013-19	—	—	TW-32015-19
10.0 scfh	SS	—	—	—	—	—	—	—	—	TW-32013-21	—	—	TW-32015-21
25.0 scfh	SS	—	—	—	—	—	—	—	—	TW-32013-23	—	—	TW-32015-23
50.0 scfh	SS	—	—	—	—	—	—	—	—	TW-32013-24	—	—	TW-32015-24
90.0 scfh	SS	—	—	—	—	—	—	—	—	TW-32013-27	—	—	—
1.9 scfm	SS	—	—	—	—	—	—	—	—	TW-32013-28	—	—	TW-32015-28
<b>For water</b>													
0.5 mL/min	G	—	—	—	—	—	TW-32012-29	—	—	TW-32013-29	—	—	TW-32015-29
6.0 mL/min	SS	TW-32010-31	—	—	TW-32011-31	—	TW-32012-31	—	—	TW-32013-31	—	—	TW-32015-31
115 mL/min	SS	TW-32010-33	—	—	TW-32011-33	—	TW-32012-33	—	—	TW-32013-33	—	—	TW-32015-33
500 mL/min	G	TW-32010-35	—	—	—	—	TW-32012-35	—	—	TW-32013-35	—	—	TW-32015-35
750 mL/min	SS	—	—	—	—	—	—	—	—	TW-32003-09	—	—	TW-32005-09

### 150-mm Direct Reading Flowmeters

Max flow	Float <sup>†</sup>	Flowmeters without valve						Flowmeters with valve					
		Aluminum fittings <sup>†</sup>		Brass fittings <sup>†</sup>		316 SS fittings <sup>†</sup>		Aluminum fittings <sup>†</sup>		Brass fittings <sup>†</sup>		316 SS fittings <sup>†</sup>	
		Cat. no.	Price	Cat. no.	Price	Cat. no.	Price	Cat. no.	Price	Cat. no.	Price	Cat. no.	Price
<b>For air</b>													
25 mL/min	Sa	TW-32030-00	—	—	TW-32031-00	—	TW-32032-00	—	—	TW-32033-00	—	—	TW-32035-00
50 mL/min	Sa	TW-32000-00	—	—	TW-32001-00	—	TW-32002-00	—	—	TW-32003-00	—	—	TW-32005-00
75 mL/min	C	TW-32000-02	—	—	—	—	TW-32002-02	—	—	TW-32003-02	—	—	TW-32005-02
100 mL/min	C	TW-32000-04	—	—	TW-32001-04	—	TW-32002-04	—	—	TW-32003-04	—	—	TW-32005-04
200 mL/min	SS	TW-32000-06	—	—	TW-32001-06	—	TW-32002-06	—	—	TW-32003-06	—	—	TW-32005-06
300 mL/min	C	TW-32000-08	—	—	TW-32001-08	—	TW-32002-08	—	—	TW-32003-08	—	—	TW-32005-08
500 mL/min	Sa	TW-32030-08	—	—	TW-32031-08	—	TW-32032-08	—	—	TW-32033-08	—	—	TW-32035-08
800 mL/min	G	TW-32030-09	—	—	TW-32031-09	—	TW-32032-09	—	—	TW-32033-09	—	—	TW-32035-09
1.25 LPM	C	TW-32030-10	—	—	TW-32031-10	—	TW-32032-10	—	—	TW-32033-10	—	—	TW-32035-10
2.5 LPM	G	TW-32000-10	—	—	TW-32001-10	—	TW-32002-10	—	—	TW-32003-10	—	—	TW-32005-10
5.0 LPM	Sa	TW-32000-12	—	—	TW-32001-12	—	TW-32002-12	—	—	TW-32003-12	—	—	TW-32005-12
10.0 LPM	G	TW-32000-14	—	—	TW-32001-14	—	TW-32002-14	—	—	TW-32003-14	—	—	TW-32005-14
23 LPM	G	TW-32030-14	—	—	TW-32031-14	—	TW-32032-14	—	—	TW-32033-14	—	—	TW-32035-14
42 LPM	SS	TW-32030-15	—	—	TW-32031-15	—	TW-32032-15	—	—	TW-32033-15	—	—	TW-32035-15
60 LPM	C	TW-32030-16	—	—	—	—	TW-32032-16	—	—	TW-32033-16	—	—	TW-32035-16
2.5 scfh	C	—	—	—	TW-32001-16	—	—	—	—	TW-32003-16	—	—	—
8.25 scfh	G	TW-32000-18	—	—	TW-32001-18	—	—	—	—	TW-32003-18	—	—	TW-32005-18
16.5 scfh	SS	—	—	—	—	—	—	—	—	TW-32003-20	—	—	TW-32005-20
23.0 scfh	C	TW-32000-22	—	—	TW-32001-22	—	—	—	—	TW-32003-22	—	—	—
50.0 scfh	G	—	—	—	TW-32001-24	—	—	—	—	TW-32003-24	—	—	TW-32005-24
94.0 scfh	SS	—	—	—	—	—	—	—	—	TW-32003-26	—	—	TW-32005-26
1.5 scfm	SS	—	—	—	—	—	—	—	—	TW-32004-26	—	—	TW-32005-26
<b>For water</b>													
10 mL/min	Sa	TW-32000-28	—	—	TW-32001-28	—	TW-32002-28	—	—	TW-32003-28	—	—	TW-32005-28
20 mL/min	SS	—	—	—	TW-32001-30	—	TW-32002-30	—	—	TW-32003-30	—	—	TW-32005-30
50 mL/min	G	—	—	—	TW-32001-32	—	TW-32002-32	—	—	TW-32003-32	—	—	TW-32005-32
100 mL/min	G	TW-32000-34	—	—	TW-32001-34	—	TW-32002-34	—	—	TW-32003-34	—	—	TW-32005-34
200 mL/min	C	—	—	—	TW-32001-36	—	TW-32002-36	—	—	TW-32003-36	—	—	TW-32005-36
500 mL/min	SS	TW-32000-38	—	—	TW-32001-38	—	TW-32002-38	—	—	TW-32003-38	—	—	TW-32005-38
1.2 LPM	SS	TW-32030-40	—	—	—	—	TW-32032-40	—	—	TW-32033-40	—	—	TW-32035-40
2.0 LPM	T	—	—	—	—	—	—	—	—	TW-32033-42	—	—	TW-32035-42

<sup>†</sup>See our specification table (on page 606) for a complete listing of wetted parts.

<sup>†</sup>Sa = sapphire, C = carbonyl, SS = 316 stainless steel, G = glass, and T = tantalum

**INNOCAL**  
INNOVATIVE CALIBRATION SOLUTIONS

**Ensure the accuracy of your flowmeter!**

**TW-17080-00** NIST-traceable calibration with data for air/gas flowmeter

**TW-17080-12** NIST-traceable calibration with data for liquid flowmeter



# Flowmeters

## Variable Area, Direct Reading

### Cole-Parmer® PTFE Flowmeters for Routine Gases

Ideal for gas applications where metal components must be minimized

- Inert PTFE and borosilicate glass wetted parts
- Rugged design with case-enclosed flow tube
- Tubes include a fused ceramic scale as a precise, permanent measuring guide

These meters eliminate the need for correlation charts with direct-reading scales for individual routine gases. The inert PTFE and glass wetted parts combine with the rigid anodized aluminum frame to offer a unique solution for ultra-pure gas applications.

Flowtubes are replaceable—contact your local dealer for details. A longitudinal magnifier lens is molded into the transparent front safety shield to enhance reading resolution by 16%.

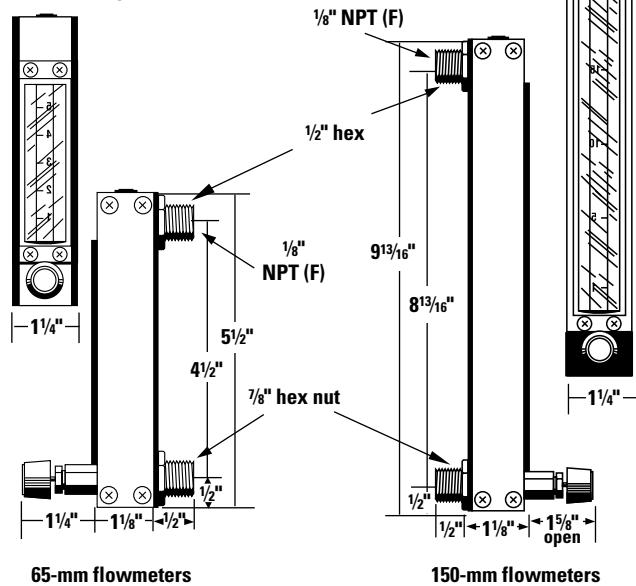


65-mm flowmeter  
32006-08

150-mm flowmeter  
32007-64

#### To Panel Mount

Two holes required to fit the inlet and outlet according to the diagrams below. Face width is 1 1/4" (3.2 cm). Secure flowmeter with the two retaining nuts (included).



#### Specifications

**Accuracy:** ±5% full-scale  
**Repeatability:** ±0.25% full-scale  
**Minimum flow rate:** approximately 10% of maximum flow rate  
**Max pressure:** 100 psi (6.9 bar)  
**Max operating temp:** 150°F (65°C)

**Connections:** 1/8" NPT(F); optional 1/4" compression fittings or glass nipples available upon request  
**Leak integrity:** meters are individually tested on a mass spectrometer leak detector and certified to a leak integrity rating of at least 1 x 10<sup>-7</sup> sccs of helium

#### Materials of Construction

Part	Aluminum	Brass	316 SS
Flowtube	Borosilicate glass		
Fittings, valves	PTFE		
O-rings	PTFE		
Float	Glass, 316 SS, carbonyl, sapphire, or tantalum		
Frame	Aluminum, acrylic, polycarbonate		



#### 65-mm PTFE Direct Reading Flowmeters

Maximum flow rate <sup>†</sup>	Float <sup>‡</sup>	Flowmeters without valve		Flowmeters with valve	
		Catalog number	Price	Catalog number	Price
<b>For carbon dioxide</b>					
20 mL/min	T	—	—	<a href="#">TW-32006-08</a>	—
55 mL/min	G	—	—	<a href="#">TW-32006-10</a>	—
220 mL/min	Sa	—	—	<a href="#">TW-32006-12</a>	—
1 LPM	G	<a href="#">TW-32007-14</a>	—	<a href="#">TW-32006-14</a>	—
6 LPM	G	<a href="#">TW-32007-16</a>	—	<a href="#">TW-32006-16</a>	—
10 LPM	T	—	—	<a href="#">TW-32006-18</a>	—
<b>For hydrogen</b>					
35 mL/min	G	<a href="#">TW-32007-24</a>	—	<a href="#">TW-32006-24</a>	—
100 mL/min	SS	—	—	<a href="#">TW-32006-26</a>	—
150 mL/min	Sa	<a href="#">TW-32007-28</a>	—	<a href="#">TW-32006-28</a>	—
600 mL/min	G	<a href="#">TW-32007-30</a>	—	<a href="#">TW-32006-30</a>	—
1.5 LPM	C	<a href="#">TW-32007-32</a>	—	<a href="#">TW-32006-32</a>	—
3.5 LPM	G	<a href="#">TW-32007-34</a>	—	<a href="#">TW-32006-34</a>	—
6 LPM	G	—	—	<a href="#">TW-32006-36</a>	—
42 LPM	SS	<a href="#">TW-32007-38</a>	—	<a href="#">TW-32006-38</a>	—

<sup>†</sup>Based on flow at STP conditions—70°F and 14.7 psi.  
<sup>‡</sup>Float material key: G = glass, SS = stainless steel, C = carbonyl, Sa = sapphire, T = titanium

#### 150-mm PTFE Direct Reading Flowmeters

Maximum flow rate <sup>†</sup>	Float <sup>‡</sup>	Flowmeters without valve		Flowmeters with valve	
		Catalog number	Price	Catalog number	Price
<b>For argon gas</b>					
33 mL/min	Sa	<a href="#">TW-32007-64</a>	—	<a href="#">TW-32006-64</a>	—
15 LPM	T	<a href="#">TW-32007-66</a>	—	<a href="#">TW-32006-66</a>	—
<b>For helium</b>					
100 mL/min	Sa	—	—	<a href="#">TW-32006-68</a>	—
500 mL/min	C	<a href="#">TW-32007-70</a>	—	<a href="#">TW-32006-70</a>	—
1500 mL/min	G	<a href="#">TW-32007-72</a>	—	<a href="#">TW-32006-72</a>	—
5 LPM	C	—	—	<a href="#">TW-32006-74</a>	—
40 LPM	SS	—	—	<a href="#">TW-32006-76</a>	—
1025 scfh	Sa	—	—	—	—
<b>For nitrogen</b>					
100 mL/min	G	<a href="#">TW-32007-80</a>	—	<a href="#">TW-32006-80</a>	—
200 mL/min	C	<a href="#">TW-32007-82</a>	—	<a href="#">TW-32006-82</a>	—
300 mL/min	SS	—	—	<a href="#">TW-32006-84</a>	—
500 mL/min	Sa	<a href="#">TW-32007-86</a>	—	<a href="#">TW-32006-86</a>	—
2 LPM	G	—	—	<a href="#">TW-32006-88</a>	—
1.6 scfh	SS	—	—	<a href="#">TW-32006-90</a>	—
<b>For oxygen</b>					
250 mL/min	SS	<a href="#">TW-32007-92</a>	—	<a href="#">TW-32006-92</a>	—
400 mL/min	G	<a href="#">TW-32007-94</a>	—	<a href="#">TW-32006-94</a>	—
5 LPM	Sa	<a href="#">TW-32007-96</a>	—	<a href="#">TW-32006-96</a>	—
16.5 LPM	SS	<a href="#">TW-32007-98</a>	—	<a href="#">TW-32006-98</a>	—
58 LPM	C	<a href="#">TW-32007-99</a>	—	<a href="#">TW-32006-99</a>	—

<sup>†</sup>Based on flow at STP conditions—70°F and 14.7 psi.  
<sup>‡</sup>Float material key: G = glass, SS = stainless steel, C = carbonyl, Sa = sapphire, T = tantalum

#### Tripod Bases

Bench mount up to three flowmeters. Clear acrylic base features three leveling screws and spirit level.



Catalog number	Number of meters held	Price
<a href="#">TW-03226-10</a>	One	—
<a href="#">TW-03226-30</a>	One, two, or three	—

**TW-31320-07 Fitting:** NPT(M) to compression adapter, PFA, 1/8"  
**TW-17080-10 NIST-traceable calibration**



**Cole-Parmer® Heavy-Duty PTFE/PFA Flowmeters**

**Unique combination of rugged frame and chemically inert wetted materials**

- The rigid aluminum frame is PFA coated to resist ambient corrosives
- Available in a 75-mm compact design or a 125-mm full-size for higher flows
- Ideal for etchants and high-purity water

Also included is a polycarbonate front shield that magnifies readings 16%. Within the tube is a guide rod to stabilize the float for better readings in extreme high/low flow or fluctuating flow conditions.

These meters are available with valves to control flow or without to simply monitor flow.

Each flowmeter is individually tested on a mass spectrometer leak detector and certified to a leak integrity rating of  $1 \times 10^{-7}$  sccs helium. All models come with correlation charts for water.



Flowmeter without valve  
32050-10



Flowmeter with valve  
32051-10

**Specifications**

**Accuracy:** ±5% full-scale  
**Max pressure:** 100 psi (6.9 bar)  
**Operating temp:** 32 to 250°F (0 to 120°C)  
**Dimensions (W x H x D)**  
 Low-range models: 75-mm scale  
 1¼" x 6½" x 3¼" (3.2 x 15.6 x 8.3 cm)  
 High-range models: 125-mm scale  
 2" x 10½" x 4" (5.1 x 26.4 x 10.2 cm)



**Materials of Construction**

Flowtube	PTFE
Fittings, valves	PTFE
Float	PTFE or sapphire
Shield	Polycarbonate
Frame	PFA-clad aluminum

Flow range <sup>†</sup>	Float <sup>‡</sup>	Connections	Flowmeters without valve		Flowmeters with valve	
			Cat. no.	Price	Cat. no.	Price
<b>Low-range flowmeters</b>						
5 to 75 mL/min	Sa	¼" NPT(F)	<a href="#">TW-32050-00</a>		<a href="#">TW-32051-00</a>	
5 to 250 mL/min	PTFE	¼" NPT(F)	<a href="#">TW-32050-02</a>		<a href="#">TW-32051-02</a>	
50 to 400 mL/min			<a href="#">TW-32050-04</a>		<a href="#">TW-32051-04</a>	
90 to 500 mL/min			<a href="#">TW-32050-06</a>		<a href="#">TW-32051-06</a>	
100 to 1000 mL/min			<a href="#">TW-32050-08</a>		<a href="#">TW-32051-08</a>	
350 to 2000 mL/min	PTFE	¾" NPT(F)	<a href="#">TW-32050-10</a>		<a href="#">TW-32051-10</a>	
800 to 2500 mL/min			<a href="#">TW-32050-12</a>		—	—
1250 to 3000 mL/min			<a href="#">TW-32050-14</a>		—	—
1750 to 5000 mL/min			<a href="#">TW-32050-16</a>		<a href="#">TW-32051-16</a>	
<b>High-range flowmeters</b>						
0.75 to 13 LPM	PTFE	½" NPT(F)	—	—	<a href="#">TW-32051-18</a>	
2 to 20 LPM			—	—	<a href="#">TW-32051-20</a>	

<sup>†</sup>Correlation data sheets for water is included with flowmeters.  
<sup>‡</sup>Float material key: Sa = sapphire

- [TW-31320-09 Fitting:](#) NPT(M) to compression adapter, PFA, ¼"
- [TW-31320-13 Fitting:](#) NPT(M) to compression adapter, PFA, ½"
- [TW-31320-11 Fitting:](#) NPT(M) to compression adapter, PFA, ¾"
- [TW-31321-26 Fitting:](#) NPT(M) to compression adapter, PFA, ¾"

**Cole-Parmer® Safe-Design PTFE/PFA Flowmeters**

**Economical design includes safety features for metering the most aggressive fluids**

- Includes a removable polycarbonate shield for added safety
- Individually leak tested with certified leak-proof integrity<sup>†</sup>
- Sight tube guide rod prevents float oscillation in dynamic systems

Ideal for use in applications requiring the high purity/high temperature suitability that fluoropolymer materials are capable of. Common applications include those with acids, caustics, solvents, and high purity liquids. The solid PTFE float is designed to maximize each meter's flow range so that many models provide an outstanding turn-down ratio. Choose from models with a valve to both monitor and control your flow or without a valve to simply monitor flow. Flowmeters are calibrated and come with correlation charts for water.



Flowmeter with valve  
32057-08

**Specifications**

**Accuracy:** ±5% full-scale  
**Max pressure:** 100 psi (6.9 bar)  
**Max operating temp:** 250°F (121°C)  
**Dimensions**  
 Low-range models: 5½" (14.4 cm) L x 1¼" OD  
 High-range models: 10½" (26.7 cm) L x 2" OD



**Materials of Construction**

Fittings, valves	PTFE/PCTFE
Shield	Polycarbonate
Flowtube	PTFE/PFA
Float	PTFE

Flow range	Connection	Flowmeters without valve		Flowmeters with valve	
		Catalog number	Price	Catalog number	Price
<b>Low-range flowmeters</b>					
10 to 125 mL/min	¼" NPT(F)	<a href="#">TW-32056-00</a>		<a href="#">TW-32057-00</a>	
5 to 250 mL/min		<a href="#">TW-32056-02</a>		<a href="#">TW-32057-02</a>	
50 to 400 mL/min		<a href="#">TW-32056-04</a>		<a href="#">TW-32057-04</a>	
90 to 500 mL/min		<a href="#">TW-32056-06</a>		—	—
100 to 1000 mL/min		<a href="#">TW-32056-08</a>		<a href="#">TW-32057-08</a>	
350 to 2000 mL/min	¾" NPT(F)	<a href="#">TW-32056-10</a>		<a href="#">TW-32057-10</a>	
800 to 2500 mL/min		<a href="#">TW-32056-12</a>		<a href="#">TW-32057-12</a>	
1250 to 3000 mL/min		<a href="#">TW-32056-14</a>		<a href="#">TW-32057-14</a>	
1750 to 5000 mL/min		<a href="#">TW-32056-16</a>		<a href="#">TW-32057-16</a>	
<b>High-range flowmeters</b>					
0.75 to 13 LPM	½" NPT(F)	<a href="#">TW-32056-18</a>		<a href="#">TW-32057-18</a>	
2 to 20 LPM		<a href="#">TW-32056-20</a>		—	—
3 to 30 LPM		<a href="#">TW-32056-22</a>		—	—
4 to 40 LPM	¾" NPT(F)	—	—	<a href="#">TW-32057-24</a>	

<sup>†</sup>Leak integrity rating of  $1 \times 10^{-7}$  sccs Helium or better.

- [TW-31320-09 Fitting:](#) NPT(M) to compression adapter, PFA, ¼"
- [TW-31320-13 Fitting:](#) NPT(M) to compression adapter, PFA, ½"



# Flowmeters

## Variable Area, Direct Reading

### Benchtop Flowmeters with PTFE Fittings

Design makes each meter suitable for a broad range of laboratory applications

- Modular components allow for meter flexibility across a wide range of flow rates
- Multiple end connections to suit process requirements

**Unshielded Flowmeters** work well in low-pressure applications. Connect the flowtube end directly to tubing having the proper inner diameter—flowtube outer diameters are listed below. Glass taper joints are an alternate connection option which slip on the PTFE stops that contain the float (contact our Application Specialists to order the glass taper joints).

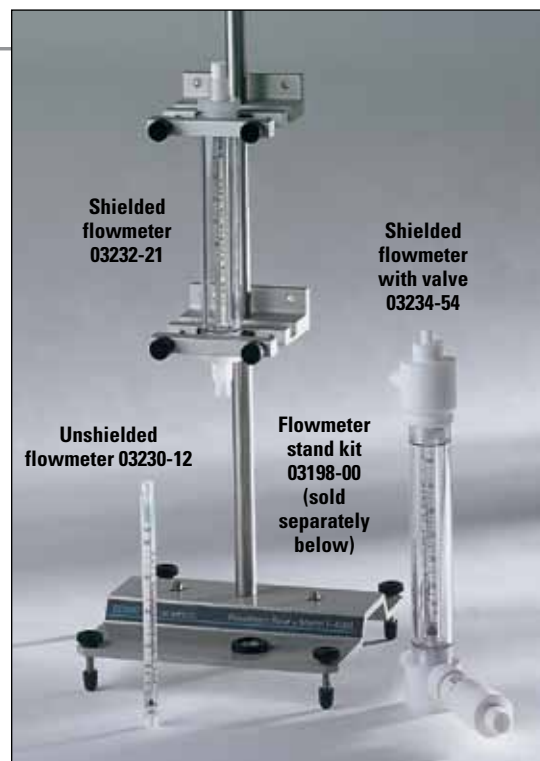
**Shielded Flowmeters** are better suited to higher-pressure applications or for installations requiring a panel-mounted flowmeter. End bushings are molded with dual connection capability—tubing or threaded; listed below are the appropriate tubing and threaded connections provided with each meter.

**Shielded Flowmeters with Valves** offer flow monitoring along with precise control through an integrated 20-turn micrometer valve. The valve can be adjusted from 0.1 to 100% of maximum flow (semilogarithmic) and provides precise regulation from 0.3 to 60% of maximum flow.

#### Materials of Construction

Part	Unshielded	Shielded	Shielded with Valve
Tube	Borosilicate glass		
O-rings	Viton®		
Inserts	PTFE	—	
Body	—	PTFE	
Couplings	—	Polypropylene (PP) with PTFE inserts†	
Shield	—	Polycarbonate	
Valve	—	Glass chamber with PCTFE plug‡	

†Order PTFE couplings (below) for a full PTFE connection. ‡Tube sizes 14 and 15 have PTFE plug.



#### Specifications

**Accuracy:** ±5% of reading or 2 mm of the scale length, whichever is greater

**Repeatability:** ±1% of reading or 1/2 scale graduation, whichever is greater

**Max pressure:** 60 psi (4.1 bar)

**Max operating temp:** 150°F (65°C)

#### Connections

For shielded flowmeters:  
 Tube sizes 10, 11, 12, 13: 3/8" ID tubing  
 Tube sizes 14, 15: 5/8" ID tubing

For unshielded flowmeters:  
 Refer to OD dimensions in table, or contact your local dealer for tapered glass fittings

#### Dimensions

Tube size(s)	Unshielded	Shielded	Shielded with valves
10, 11, 12	5 1/8" H x 5/16" OD	8" H x 1" OD	8 7/8" H x 6" W x 1 5/16" OD
13	5 1/8" H x 7/16" OD		
14	5 1/2" H x 1 1/16" OD	9 3/4" H x 1 1/2" OD	
15	5 1/2" H x 1 5/16" OD		11" H x 7" W x 1 5/16" OD



Flow ranges		Floats†† included	Tube size	Unshielded flowmeters			Shielded flowmeters				Shielded flowmeters with valves			
Air (mL/min)	Water (mL/min)			Catalog number	Max psi	Price	Catalog number	Ports†† NPT	Max psi	Price	Catalog number	Ports† NPT	Max psi	Price
0.2 to 90	0.002 to 1.1	Glass	10	<a href="#">TW-03230-10</a>	15		<a href="#">TW-03232-20</a>	1/4"	125		<a href="#">TW-03234-51</a>	1/8"	125	
0.36 to 160	0.004 to 2.3	316 SS												
1 to 280	0.01 to 4.0	Glass	11	<a href="#">TW-03230-11</a>	15		<a href="#">TW-03232-21</a>	1/4"	125		<a href="#">TW-03234-52</a>	1/8"	125	
2 to 500	0.02 to 8.6	316 SS												
20 to 2100	0.4 to 40	Glass	12	<a href="#">TW-03230-12</a>	15		<a href="#">TW-03232-22</a>	1/4"	100		<a href="#">TW-03234-53</a>	1/8"	100	
36 to 3700	0.86 to 86	316 SS												
200 to 14,000	2 to 300	Glass	13	<a href="#">TW-03230-13</a>	15		<a href="#">TW-03232-23</a>	1/4"	75		<a href="#">TW-03234-54</a>	1/8"	75	
360 to 25,000	4 to 640	316 SS												
1000 to 6,000	10 to 850	Glass	14	<a href="#">TW-03230-14</a>	15		<a href="#">TW-03232-24</a>	1/2"	60		<a href="#">TW-03234-56</a>	1/4"	60	
1800 to 64,000	21 to 1820	316 SS												
3000 to 77,000	30 to 1900	Glass	15	<a href="#">TW-03230-15</a>	15		<a href="#">TW-03232-25</a>	1/2"	50		<a href="#">TW-03234-57</a>	1/4"	50	
5300 to 137,000	64 to 4100	316 SS												

††When using the stainless steel float, refer to the correlation chart (included) for proper readings.

\*\*Port sizes are relevant only if couplings are removed; otherwise, users should reference information in the specifications list.

**Flowmeter Stand Kit** contains everything you need to mount your Gilmont flowmeter on a benchtop or wall. Mount valved flowmeters directly—base accepts two large flowmeters (tube size 14 or 15) or three of the smaller flowmeters (tube size 10, 11, 12, and 13).

[TW-03198-00](#) Flowmeter stand kit. Includes one base, one rod, and two mounting clamps

[TW-03198-10](#) Replacement flowmeter base

[TW-03198-20](#) Replacement rod, 18"L (45.7 cm)

[TW-03198-30](#) Replacement mounting clamp

[TW-03198-40](#) PTFE coupling adapter with Viton O-rings replaces the threaded polypropylene bushings on shielded flowmeters to provide an all-PTFE connection; 1/4" NPT(F) port

[TW-31320-07 Fitting:](#) NPT(M) to compression adapter, PFA, 1/8"  
[TW-31320-09 Fitting:](#) NPT(M) to compression adapter, PFA, 1/4"  
[TW-31320-13 Fitting:](#) NPT(M) to compression adapter, PFA, 1/2"



Ensure the accuracy of your flowmeter!

[TW-17080-00](#) NIST-traceable calibration with data for air/gas flowmeter

[TW-17080-12](#) NIST-traceable calibration with data for liquid flowmeter



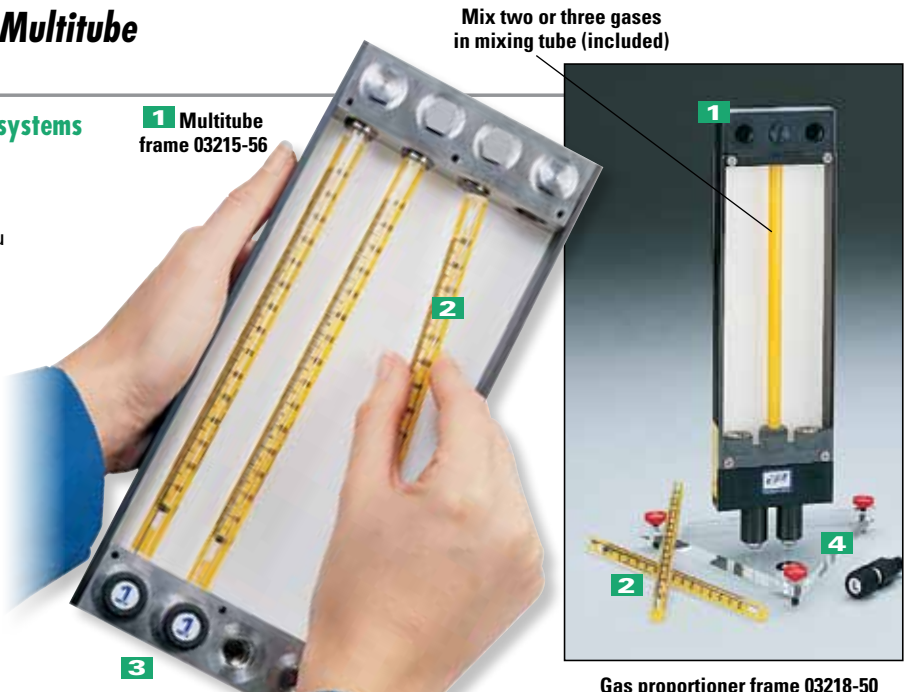
**Cole-Parmer Single and Multitube Flowmeter Systems**

Create your own multitube or gas proportioner systems for complete flexibility

Design a flow system to meet your multi-channel metering, mixing, or monitoring applications. We offer a variety of frames and flowtubes so that you can create the system to meet your exact needs. If you need assistance in putting together a system, call your local dealer.

**REQUIRED SYSTEM Components**

- 1 Frame: single or multitube . . . . . 611
- 2 Flowtube(s) for air, water, and various gases . . . . . 612-613
- 3 Valve cartridge(s) to control flow rates . . . . . 613
- 4 Tripod base for your benchtop applications . . . 613



Gas proportioner frame 03218-50 shown with tripod base 03218-58

**1 Frames**

Choose a frame depending on the flowtube capacity, flow pattern, and wetted parts that you require. For frames with PTFE wetted parts, call your local dealer for information. Single and multitube frames accept both direct-reading and correlated flowtubes; gas proportioner frames accept only correlated flowtubes. All frames include an instruction manual.

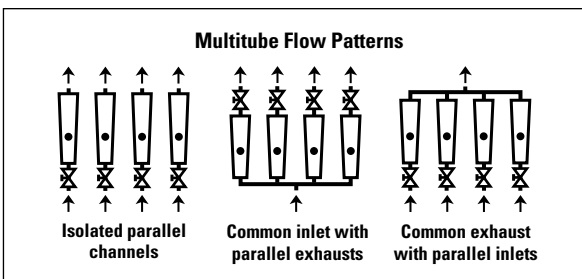
**Specifications**

- Minimum flow rate:** approx 10% of max flow rate of flowtube
- Max pressure:** 200 psi (13.7 bar)
- Operating temp:** -15 to 250°F (-26 to 121°C)
- Connections:** 1/8" NPT(F)



**Materials of construction**

- Side panels: black anodized aluminum
- Front shield: 1/8"-thick polycarbonate
- Back plate: 1/8"-thick acrylic
- O-rings and packing: Buna N for aluminum models, Viton® for 316 SS models



**Single-Tube Frames**

Choose a frame with valve port if you plan on adding a valve cartridge (page 613) to control flow.

Number of flowtubes held	Valve port	Aluminum wetted parts		316 SS wetted parts	
		Cat. no.	Price	Cat. no.	Price
<b>Single-tube frames for 65-mm flowtubes</b>					
One	No	TW-03220-00		TW-03220-40	
	Yes	TW-03220-08		TW-03220-44	
<b>Single-tube frames for 150-mm flowtubes</b>					
One	No	TW-03220-06		TW-03220-42	
	Yes	TW-03220-10		TW-03220-46	

**Multitube Frames**

These frames have valve ports which accept valve cartridges to control flow. A tripod base is required to use the multitube frame with the common inlet flow pattern; all other multitube frames are designed for panel and tripod mounting.

Number of flowtubes held	Flow pattern	Aluminum wetted parts		316 SS wetted parts	
		Cat. no.	Price	Cat. no.	Price
<b>Multitube frames for 65-mm flowtubes</b>					
Two	Isolated Common	TW-03214-10		TW-03214-16	
		TW-03214-12		TW-03214-18	
Three	Isolated Common	TW-03214-28		TW-03214-34	
		TW-03214-30		TW-03214-36	
Four	Isolated Common	TW-03214-46		TW-03214-52	
		TW-03214-50		TW-03214-56	
Five	Isolated Common	TW-03214-62		TW-03214-66	
		TW-03214-64		TW-03214-68	
Six	Isolated Common	TW-03214-74		TW-03214-78	
		TW-03214-76		TW-03214-80	
<b>Multitube frames for 150-mm flowtubes</b>					
Two	Isolated Common	TW-03215-10		TW-03215-16	
		TW-03215-12		TW-03215-18	
Three	Isolated Common	TW-03215-28		TW-03215-34	
		TW-03215-30		TW-03215-36	
Four	Isolated Common	TW-03215-46		TW-03215-52	
		TW-03215-50		TW-03215-56	
Five	Isolated Common	TW-03215-62		TW-03215-66	
		TW-03215-64		TW-03215-68	
Six	Isolated Common	TW-03215-74		TW-03215-78	
		TW-03215-76		TW-03215-80	

**Gas Proportioner Multitube Frames**

These multitube frames with valves allow you to increase or decrease gas concentrations accurately at any time during an experiment—blend two or three gases at the exact concentration you require. Frames include a installation tool and mixing tube. **Note:** use only with the 150-mm correlated flowtubes on page 612. Flow tubes come with gas correlation charts.

Number of flowtubes held	Flow pattern	Aluminum wetted parts		316 SS wetted parts	
		Cat. no.	Price	Cat. no.	Price
<b>Gas proportioner frames for 150-mm correlated flowtubes</b>					
Two	—	TW-03218-50		TW-03218-52	
Three	—	TW-03218-54		TW-03218-56	

See next page for more...



# Flowmeters

Variable Area, Component Systems

## Cole-Parmer Single and Multitube Flowmeter Systems

### 2A Flowtubes for Air and Water

Choose 65- or 150-mm flowtubes depending on the selected frame size. Flowtubes are calibrated for direct-reading or correlated reading of air or water at STP (70°F/21.1°C and 14.7 psi/1 atm).

Flowtubes for specialty gases—argon, nitrogen, hydrogen, helium, carbon dioxide, and oxygen—are available on page 613.

Flowtube 32047-28

Flowtube 32047-56

### Specifications



Repeatability: ±0.25% full-scale

Minimum flow rate: approx 10% of max flow rate

### Materials of construction

Flowtube: heavy-walled borosilicate glass  
Float: glass, stainless steel (SS), carbonyl, sapphire, or tantalum

### Direct-Reading Flowtubes for Air (Accuracy: ±5%)

Catalog number	Max flow rate	Float	Price
<b>65-mm flowtubes</b>			
<a href="#">TW-32047-00</a>	2.2 scfh	Glass	
<a href="#">TW-32047-01</a>	6.0 scfh	Glass	
<a href="#">TW-32047-02</a>	10 scfh	SS	
<a href="#">TW-32047-04</a>	25 scfh	SS	
<a href="#">TW-32047-08</a>	1.9 scfm	SS	
<a href="#">TW-32047-09</a>	1.0 LPM	Glass	
<a href="#">TW-32047-10</a>	1.15 LPM	Glass	
<a href="#">TW-32047-11</a>	2.0 LPM	SS	
<a href="#">TW-32047-12</a>	4.0 LPM	SS	
<a href="#">TW-32047-13</a>	5.0 LPM	Glass	
<a href="#">TW-32047-14</a>	10 LPM	SS	
<a href="#">TW-32047-15</a>	16 LPM	SS	
<a href="#">TW-32047-16</a>	25 LPM	SS	
<a href="#">TW-32047-17</a>	40 LPM	SS	
<a href="#">TW-32047-18</a>	7 mL/min	Glass	
<a href="#">TW-32047-19</a>	50 mL/min	SS	
<a href="#">TW-32047-20</a>	75 mL/min	SS	
<a href="#">TW-32047-21</a>	100 mL/min	Glass	
<a href="#">TW-32047-22</a>	250 mL/min	Carbonyl	
<a href="#">TW-32047-23</a>	500 mL/min	Carbonyl	
<b>150-mm flowtubes</b>			
<a href="#">TW-32047-50</a>	2.5 scfh	Carbonyl	
<a href="#">TW-32047-51</a>	5 scfh	Glass	
<a href="#">TW-32047-53</a>	10 scfh	SS	
<a href="#">TW-32047-55</a>	23 scfh	Carbonyl	
<a href="#">TW-32047-56</a>	50 scfh	Glass	
<a href="#">TW-32047-57</a>	90 scfh	SS	
<a href="#">TW-32047-60</a>	1.25 LPM	Carbonyl	
<a href="#">TW-32047-61</a>	2.5 LPM	Glass	
<a href="#">TW-32047-62</a>	4.0 LPM	Glass	
<a href="#">TW-32047-63</a>	4.5 LPM	Sapphire	
<a href="#">TW-32047-64</a>	5.0 LPM	Sapphire	
<a href="#">TW-32047-65</a>	10 LPM	Carbonyl	
<a href="#">TW-32047-67</a>	23 LPM	Glass	
<a href="#">TW-32047-68</a>	42 LPM	SS	
<a href="#">TW-32047-69</a>	60 LPM	Carbonyl	
<a href="#">TW-32047-70</a>	25 mL/min	Sapphire	
<a href="#">TW-32047-71</a>	50 mL/min	Sapphire	
<a href="#">TW-32047-72</a>	75 mL/min	Carbonyl	
<a href="#">TW-32047-73</a>	100 mL/min	Sapphire	
<a href="#">TW-32047-74</a>	200 mL/min	SS	
<a href="#">TW-32047-76</a>	500 mL/min	Sapphire	
<a href="#">TW-32047-77</a>	800 mL/min	Glass	

### REQUIRED SYSTEM Components

- 1 Frame: single or multitube . . . . . 611
- 2 Flowtube(s) for air, water, and various gases . . . . . 612-613
- 3 Valve cartridge(s) to control flow rates . . . . . 613
- 4 Tripod base for your benchtop applications . . . . . 613



### Direct-Reading Flowtubes for Water (Accuracy: ±5%)

Catalog number	Max flow rate	Float	Price
<b>65-mm flowtubes</b>			
<a href="#">TW-32047-27</a>	6.0 mL/min	SS	
<a href="#">TW-32047-28</a>	60 mL/min	SS	
<a href="#">TW-32047-29</a>	115 mL/min	SS	
<a href="#">TW-32047-31</a>	250 mL/min	Glass	
<a href="#">TW-32047-32</a>	500 mL/min	Glass	
<b>150-mm flowtubes</b>			
<a href="#">TW-32047-81</a>	1.2 LPM	SS	
<a href="#">TW-32047-82</a>	2.0 LPM	Tantalum	
<a href="#">TW-32047-84</a>	10 mL/min	Sapphire	
<a href="#">TW-32047-86</a>	50 mL/min	Glass	
<a href="#">TW-32047-88</a>	100 mL/min	Glass	
<a href="#">TW-32047-89</a>	200 mL/min	Carbonyl	
<a href="#">TW-32047-90</a>	500 mL/min	SS	

### Correlated Flowtubes for Air and Water (Accuracy: ±2%)

Catalog number	Max flow rate			Float	Price
	Air	Air (50 psi)	Water		
<b>65-mm flowtubes</b>					
<a href="#">TW-03219-50</a>	5.8 mL/min	—	0.065 mL/min	Glass	
<a href="#">TW-03219-51</a>	16.7 mL/min	—	0.283 mL/min	SS	
<a href="#">TW-03219-52</a>	48.7 mL/min	—	0.55 mL/min	Glass	
<a href="#">TW-03219-53</a>	145 mL/min	—	2.38 mL/min	SS	
<a href="#">TW-03219-54</a>	202.1 mL/min	—	2.6 mL/min	Glass	
<a href="#">TW-03219-55</a>	522 mL/min	—	12 mL/min	SS	
<a href="#">TW-03219-56</a>	1249 mL/min	—	27 mL/min	Glass	
<a href="#">TW-03219-58</a>	2040 mL/min	—	39.7 mL/min	Glass	
<a href="#">TW-03219-57</a>	2520 mL/min	—	70.7 mL/min	SS	
<a href="#">TW-03219-59</a>	3990 mL/min	—	108.3 mL/min	SS	
<a href="#">TW-03219-60</a>	6318 mL/min	—	147 mL/min	Glass	
<a href="#">TW-03219-62</a>	23,169 mL/min	—	522 mL/min	Glass	
<a href="#">TW-03219-66</a>	58,500 mL/min	—	1866 mL/min	Carbonyl	
<b>150-mm flowtubes</b>					
<a href="#">TW-03219-70</a>	18.9 mL/min	83 mL/min	0.19 mL/min	Glass	
<a href="#">TW-03217-05</a>	49.1 mL/min	191.6 mL/min	0.49 mL/min	Glass	
<a href="#">TW-03217-07</a>	60.6 mL/min	242 mL/min	0.945 mL/min	SS	
<a href="#">TW-03217-09</a>	92 mL/min	324 mL/min	0.85 mL/min	Glass	
<a href="#">TW-03217-11</a>	137 mL/min	460 mL/min	2.34 mL/min	SS	
<a href="#">TW-03217-15</a>	264 mL/min	825 mL/min	4.74 mL/min	SS	
<a href="#">TW-03217-13</a>	374 mL/min	1086 mL/min	5.5 mL/min	Glass	
<a href="#">TW-03217-17</a>	814 mL/min	2024 mL/min	20.4 mL/min	SS	
<a href="#">TW-03217-21</a>	2313 mL/min	5528 mL/min	53.5 mL/min	Glass	
<a href="#">TW-03217-19</a>	4562 mL/min	10,813 mL/min	130.4 mL/min	SS	
<a href="#">TW-03217-29</a>	8678 mL/min	19,767 mL/min	210 mL/min	Glass	
<a href="#">TW-03217-23</a>	16,737 mL/min	38,995 mL/min	506 mL/min	SS	
<a href="#">TW-03217-33</a>	22,536 mL/min	49,374 mL/min	541 mL/min	Glass	
<a href="#">TW-03219-72</a>	41,512 mL/min	89,880 mL/min	1288 mL/min	SS	
<a href="#">TW-03219-74</a>	59,494 mL/min	123,846 mL/min	1881 mL/min	Carbonyl	

[TW-17080-00](#) NIST-traceable calibration with data for air/gas flowmeter  
[TW-17080-12](#) NIST-traceable calibration with data for liquid flowmeter

See previous page for frames...



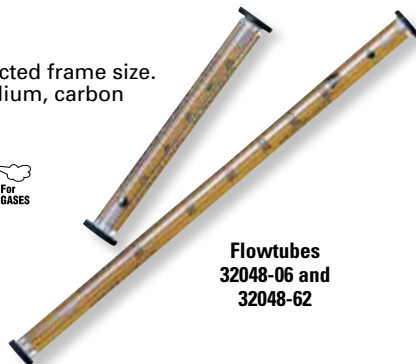
**2B Direct Reading Flowtubes for Specialty Gases**

Choose 65- or 150-mm flowtubes, depending on the selected frame size. Flowtubes read directly in argon, nitrogen, hydrogen, helium, carbon dioxide, or oxygen at STP (70°F/21°C and 14.7 psi/1 atm).

**Specifications**

**Accuracy:** ±5% full-scale  
**Repeatability:** ±0.25% full-scale  
**Minimum flow rate:** approx 10% of maximum flow rate

**Materials of construction**  
Flowtube: heavy-walled borosilicate glass  
Float: glass, stainless steel (SS), carbonyl, or sapphire



Flowtubes  
32048-06 and  
32048-62

**REQUIRED SYSTEM Components**

- 1 Frame: single or multitube ..... 611
- 2 Flowtube(s) for air, water, and various gases ..... 612-613
- 3 Valve cartridge(s) to control flow rates ..... 613
- 4 Tripod base for your benchtop applications ..... 613



**Direct-Reading, Carbon Dioxide**

Cat. no.	Max flow rate	Float	Price
<b>65-mm flowtubes</b>			
TW-32048-04	1.0 LPM	Glass	
TW-32048-05	6.0 LPM	Glass	
TW-32048-06	10 LPM	SS	
TW-32048-07	20 mL/min	SS	
TW-32048-08	55 mL/min	Glass	
TW-32048-09	220 mL/min	Sapphire	

**Direct-Reading, Nitrogen**

Cat. no.	Max flow rate	Float	Price
<b>65-mm flowtubes</b>			
TW-32048-20	12 LPM	SS	
TW-32048-21	6 mL/min	Glass	
TW-32048-22	50 mL/min	SS	
TW-32048-23	60 mL/min	Sapphire	
TW-32048-24	120 mL/min	Glass	
TW-32048-25	200 mL/min	Sapphire	
<b>150-mm flowtubes</b>			
TW-32048-58	1.6 scfm	SS	
TW-32048-59	2.0 LPM	Glass	
TW-32048-60	100 mL/min	Glass	
TW-32048-61	200 mL/min	Carbonyl	
TW-32048-62	300 mL/min	Carbonyl	
TW-32048-63	500 mL/min	Sapphire	

**Direct-Reading, Hydrogen**

Cat. no.	Max flow rate	Float	Price
<b>65-mm flowtubes</b>			
TW-32048-12	1.5 LPM	Carbonyl	
TW-32048-13	3.5 LPM	Glass	
TW-32048-14	6.0 LPM	Glass	
TW-32048-15	42 LPM	SS	
TW-32048-16	35 mL/min	Glass	
TW-32048-17	100 mL/min	SS	
TW-32048-18	150 mL/min	Sapphire	
TW-32048-19	600 mL/min	Glass	

**Direct-Reading, Helium**

Cat. no.	Max flow rate	Float	Price
<b>65-mm flowtubes</b>			
TW-32048-10	65 mL/min	Sapphire	
TW-32048-11	120 mL/min	Glass	
<b>150-mm flowtubes</b>			
TW-32048-53	5.0 LPM	Carbonyl	
TW-32048-54	40 LPM	SS	
TW-32048-55	100 mL/min	Sapphire	
TW-32048-56	500 mL/min	Carbonyl	
TW-32048-57	1500 mL/min	Glass	

**Direct-Reading, Argon**

Cat. no.	Max flow rate	Float	Price
<b>65-mm flowtubes</b>			
TW-32048-00	2.5 scfh	Glass	
TW-32048-01	10 scfh	SS	
TW-32048-02	22 scfh	SS	
TW-32048-03	50 scfh	Glass	
<b>150-mm flowtubes</b>			
TW-32048-50	15 LPM	SS	
TW-32048-51	33 mL/min	SS	

**Direct-Reading, Oxygen**

Cat. no.	Max flow rate	Float	Price
<b>65-mm flowtubes</b>			
TW-32048-26	1.0 LPM	Glass	
TW-32048-27	4.0 LPM	SS	
TW-32048-28	8.0 LPM	SS	
TW-32048-29	15 LPM	SS	
TW-32048-30	50 mL/min	Glass	
TW-32048-31	300 mL/min	SS	
TW-32048-32	500 mL/min	SS	
<b>150-mm flowtubes</b>			
TW-32048-64	5.0 LPM	Sapphire	
TW-32048-65	16.5 LPM	SS	
TW-32048-66	58 LPM	Carbonyl	
TW-32048-67	250 mL/min	SS	
TW-32048-68	400 mL/min	Sapphire	

**3 Valve Cartridges**

Use these metering needle valve cartridges to control flow rate. Simply insert into the valve port on the flowmeter frame. Select a valve cartridge compatible with your frame material: aluminum or stainless steel (SS). Choose a high-resolution metering valve cartridge for greater precision of flow rate.



**Specifications**

**Materials of Construction**

Frame	Aluminum	316 SS
Standard		
Body	Aluminum	316 SS
Needle	316 SS	
Orifice	PTFE	
O-rings	Buna N	Viton®
High-resolution		
Body	Brass	316 SS
Needle	316 SS	
Orifice	PTFE	
O-rings	Buna N	Viton

Flow ranges (mL/min) <sup>†</sup>		Aluminum frame		316 SS frame	
For air and gases	For water	Catalog number	Price	Catalog number	Price
<b>Standard valve cartridges, 10 turn</b>					
5000 to 20,000	0 to 350	TW-03217-92		TW-03217-82	
20,000 to 60,000	0 to 1200	TW-03217-88		TW-03217-84	
60,001	0 to 3500	TW-03217-96		TW-03217-86	
<b>High-resolution valve cartridges, 16 turn</b>					
0 to 200	0 to 6	TW-03218-72		TW-03218-74	
201 to 1000	3.1 to 30	TW-03218-61		TW-03218-67	
1001 to 2500	30 to 70	TW-03218-62		TW-03218-68	
2501 to 6200	71 to 200	TW-03218-63		TW-03218-69	
≥ 6201	≥ 650	TW-03218-64		TW-03218-70	

<sup>†</sup>If your flowtube is in units other than mL/min, convert them to mL/min and choose a valve within that flow range. See pages 2013-2016 for conversion factors.

**4 Tripod Bases**

Use base for benchtop applications. Three leveling screws and spirit level are built into a clear acrylic base.

**Note:** a tripod base is required to use the multitube frame with the common inlet flow pattern; all other multitube frames are designed for panel and tripod mounting.



Tripod base 03226-50

Catalog number	Use with	Price
<b>For multitube frames</b>		
TW-03226-50	2-, 4-, or 6-tube models; or isolated models	
TW-03226-40	3- or 5-tube models; or common inlet models	
<b>For gas proportioner frames</b>		
TW-03218-58	Models 03218-50, -52	
TW-03218-59	Models 03218-54, -56	



# Flowmeters

## Variable Area, Correlated

### Cole-Parmer® 65-mm Flowmeters

Clear polycarbonate front shield magnifies scale 16% for easier reading

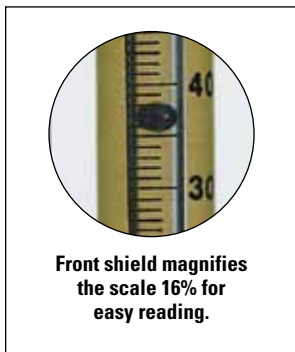
- A vertical tangential locator line ensures hairline accuracy in reading float position
- Ceramic millimeter scale is fused directly to flowtube
- 16-turn high-precision valve features a “nonrising stem” to more accurately set your desired flow point

Each flowmeter consists of a heavy-walled glass flowtube mounted in a frame with white acrylic back plate (1/8" thick). **Aluminum** flowmeters are economical and good for general use with noncorrosive gases and liquids. **Brass** flowmeters are economical and good for use with water. **316 Stainless Steel** flowmeters feature excellent chemical compatibility.

Select a flowmeter with a high-resolution valve for superior flow rate control—ideal for low-flow applications or for any application where you need precise flow control. All flowmeters come with correlation data sheets for water and air at standard temperature and pressure (STP). We can also supply calibration data for oxygen, nitrogen, hydrogen, helium, CO<sub>2</sub>, argon, other liquids and gases, and for conditions other than STP—call your local dealer for more information.



Brass flowmeter  
03268-64



Front shield magnifies the scale 16% for easy reading.

#### Specifications

- Accuracy:** ±5% full-scale for meters with rate of 0.065 and 0.283 mL/min of H<sub>2</sub>O  
±2% full-scale for remaining
- Repeatability:** ±0.25% full-scale
- Max pressure:** 200 psi (13.7 bar)
- Operating temp:** -15 to 250°F (-26 to 121°C)
- Connections:** 1/8" NPT(F)

ISO9001:2008  
CERTIFIED SUPPLIER



#### Materials of Construction

Part	Aluminum	Brass	SS
Flowtube	Borosilicate glass		
Fittings, valves	Aluminum	Chrome-plated brass	316 SS
O-rings	Buna N		Viton®
Float	Glass, 316 SS, or carboloy		
Shield	Polycarbonate		
Frame	Aluminum/acrylic		

#### MORE online!

For pressure drop information for these flowmeters, go to ...

[ColeParmer.com](http://ColeParmer.com)

Maximum flow rate (mL/min) <sup>†</sup>									Float <sup>††</sup>	Correlated meters without valves		
H <sub>2</sub> O <sup>‡</sup>	Air <sup>‡</sup>	O <sub>2</sub>	N <sub>2</sub>	H <sub>2</sub>	He	CO <sub>2</sub>	Ar	Aluminum Cat. no.		Brass Cat. no.	316 SS Cat. no.	
0.065	5.8	5.1	5.6	14	5.5	6.6	4.3	G	TW-03266-00	TW-03268-50	TW-03268-01	
0.283	16.7	15.3	17.6	32	15.8	20.2	14.2	SS	TW-03266-02	TW-03268-52	TW-03268-03	
0.55	48.7	46	51	99	47	59.2	38	G	TW-03266-04	TW-03268-54	TW-03268-05	
1.75	104	94	113	284	99	122	86	G	TW-03266-08	TW-03268-58	TW-03268-09	
2.38	145	132	149	314	146	160	122	SS	TW-03266-06	—	TW-03268-07	
2.6	202.1	189	215	502	211	221	174.2	G	TW-03266-15	—	TW-03268-18	
7.74	299	268	312	828	313	310	246	SS	TW-03266-09	TW-03268-60	TW-03268-16	
12	522	480	530	1488	636	489	429	SS	TW-03266-17	TW-03268-64	TW-03268-15	
20.5	992	970	1015	3218	1903	883	829	G	TW-03266-19	—	TW-03268-20	
27	1249	1165	1293	3923	1990	1110	1065	G	TW-03266-16	TW-03268-66	TW-03268-17	
39.7	2040	1928	2091	6359	3470	1794	1784	G	TW-03266-20	—	TW-03268-21	
52	2678	2323	2624	9410	4853	2237	2171	G	TW-03266-24	—	TW-03268-25	
55.5	1946	1842	1983	6598	4128	1699	1645	SS	TW-03266-21	—	TW-03268-22	
70.7	2520	2360	2610	8602	4970	2190	2124	SS	TW-03266-18	TW-03268-68	TW-03268-19	
108.3	3990	3761	4097	13,600	8699	3449	3388	SS	TW-03266-22	TW-03268-72	TW-03268-23	
147	6318	5880	6380	21,712	13,750	5470	5290	G	TW-03266-28	TW-03268-78	TW-03268-29	
150	4922	4733	5026	17,966	10,947	4225	4172	SS	TW-03266-26	TW-03268-76	TW-03268-27	
309	13,153	12,341	13,412	47,100	29,762	11,156	11,125	G	TW-03266-32	—	TW-03268-33	
364	12,058	11,250	12,200	42,040	27,300	10,150	10,175	SS	TW-03266-30	TW-03268-80	TW-03268-31	
745	24,680	23,322	25,311	90,323	58,472	20,798	21,116	SS	TW-03266-34	—	TW-03268-35	
<b>Price</b>												
<b>High-flow flowmeters</b>												
522	23,169	21,686	23,506	80,752	51,380	19,379	19,817	G	TW-03266-36	—	TW-03268-37	
1261	42,094	40,053	43,487	154,750	104,600	35,100	37,441	SS	TW-03266-38	TW-03268-88	TW-03268-39	
1866	58,500	55,539	60,618	220,500	148,114	47,950	50,200	C	TW-03266-40	—	TW-03268-41	
<b>Price</b>												

<sup>†</sup>Correlation data sheets for water and air are included with flowmeters.

<sup>‡</sup>Flow rates are at standard temperature and pressure (70°F and 14.7 psi). Minimum flow rate is approx 10% of the maximum flow rate.

<sup>††</sup>Float material key: G = glass, SS = 316 stainless steel, C = carboloy





**INNOCAL®**  
INNOVATIVE CALIBRATION SOLUTIONS

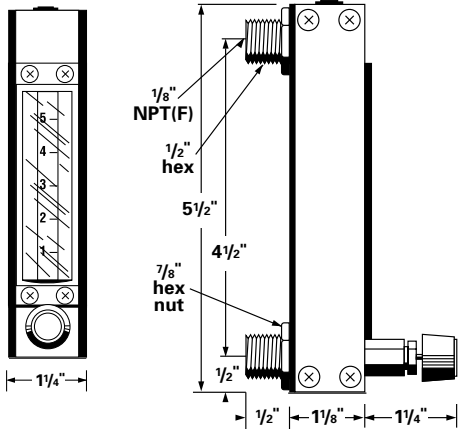
**Ensure the accuracy of your flowmeter!**

[TW-17080-00](#) NIST-traceable calibration with data for air/gas flowmeter

[TW-17080-12](#) NIST-traceable calibration with data for liquid flowmeter

**To Panel Mount**

Drill two holes to fit the inlet and outlet according to the diagrams below. Face width is 1 1/4" (3.2 cm). Secure flowmeter with the two retaining nuts (included).



Aluminum flowmeter  
03216-00  
with valve



Aluminum flowmeter  
32044-00 with  
high-resolution valve

Correlated meters with 10-turn valves			Correlated meters with high-resolution 16-turn valves		
Aluminum	Brass	316 SS	Aluminum	Brass	316 SS
Cat. no.	Cat. no.	Cat. no.	Cat. no.	Cat. no.	Cat. no.
<a href="#">TW-03216-00</a>	<a href="#">TW-03293-00</a>	<a href="#">TW-03218-01</a>	<a href="#">TW-32044-00</a>	<a href="#">TW-32045-00</a>	<a href="#">TW-32046-01</a>
<a href="#">TW-03216-02</a>	<a href="#">TW-03293-02</a>	<a href="#">TW-03218-03</a>	<a href="#">TW-32044-02</a>	<a href="#">TW-32045-02</a>	<a href="#">TW-32046-03</a>
<a href="#">TW-03216-04</a>	<a href="#">TW-03293-04</a>	<a href="#">TW-03218-05</a>	<a href="#">TW-32044-04</a>	<a href="#">TW-32045-04</a>	<a href="#">TW-32046-05</a>
<a href="#">TW-03216-08</a>	<a href="#">TW-03293-08</a>	<a href="#">TW-03218-09</a>	<a href="#">TW-32044-08</a>	<a href="#">TW-32045-08</a>	<a href="#">TW-32046-09</a>
<a href="#">TW-03216-06</a>	<a href="#">TW-03293-06</a>	<a href="#">TW-03218-07</a>	<a href="#">TW-32044-06</a>	<a href="#">TW-32045-06</a>	<a href="#">TW-32046-07</a>
<a href="#">TW-03216-12</a>	<a href="#">TW-03293-12</a>	<a href="#">TW-03218-13</a>	<a href="#">TW-32044-12</a>	<a href="#">TW-32045-12</a>	<a href="#">TW-32046-13</a>
<a href="#">TW-03216-10</a>	<a href="#">TW-03293-10</a>	<a href="#">TW-03218-11</a>	<a href="#">TW-32044-10</a>	<a href="#">TW-32045-10</a>	<a href="#">TW-32046-11</a>
<a href="#">TW-03216-14</a>	<a href="#">TW-03293-14</a>	<a href="#">TW-03218-15</a>	<a href="#">TW-32044-14</a>	<a href="#">TW-32045-14</a>	<a href="#">TW-32046-15</a>
<a href="#">TW-03216-15</a>	<a href="#">TW-03293-15</a>	<a href="#">TW-03218-16</a>	<a href="#">TW-32044-15</a>	<a href="#">TW-32045-15</a>	<a href="#">TW-32046-16</a>
<a href="#">TW-03216-16</a>	<a href="#">TW-03293-16</a>	<a href="#">TW-03218-17</a>	<a href="#">TW-32044-16</a>	<a href="#">TW-32045-16</a>	<a href="#">TW-32046-17</a>
<a href="#">TW-03216-20</a>	<a href="#">TW-03293-20</a>	<a href="#">TW-03218-21</a>	<a href="#">TW-32044-20</a>	<a href="#">TW-32045-20</a>	<a href="#">TW-32046-21</a>
<a href="#">TW-03216-24</a>	<a href="#">TW-03293-24</a>	<a href="#">TW-03218-25</a>	<a href="#">TW-32044-24</a>	<a href="#">TW-32045-24</a>	—
<a href="#">TW-03216-17</a>	<a href="#">TW-03293-17</a>	<a href="#">TW-03218-18</a>	<a href="#">TW-32044-17</a>	<a href="#">TW-32045-17</a>	<a href="#">TW-32046-18</a>
<a href="#">TW-03216-18</a>	<a href="#">TW-03293-18</a>	<a href="#">TW-03218-19</a>	<a href="#">TW-32044-18</a>	<a href="#">TW-32045-18</a>	<a href="#">TW-32046-19</a>
<a href="#">TW-03216-22</a>	<a href="#">TW-03293-22</a>	<a href="#">TW-03218-23</a>	<a href="#">TW-32044-22</a>	—	<a href="#">TW-32046-23</a>
<a href="#">TW-03216-28</a>	<a href="#">TW-03293-28</a>	<a href="#">TW-03218-29</a>	<a href="#">TW-32044-28</a>	<a href="#">TW-32045-28</a>	—
<a href="#">TW-03216-26</a>	<a href="#">TW-03293-26</a>	<a href="#">TW-03218-27</a>	<a href="#">TW-32044-26</a>	<a href="#">TW-32045-26</a>	<a href="#">TW-32046-27</a>
<a href="#">TW-03216-32</a>	<a href="#">TW-03293-32</a>	<a href="#">TW-03218-33</a>	<a href="#">TW-32044-32</a>	<a href="#">TW-32045-32</a>	<a href="#">TW-32046-33</a>
<a href="#">TW-03216-30</a>	<a href="#">TW-03293-30</a>	<a href="#">TW-03218-31</a>	<a href="#">TW-32044-30</a>	<a href="#">TW-32045-30</a>	<a href="#">TW-32046-31</a>
<a href="#">TW-03216-34</a>	<a href="#">TW-03293-34</a>	<a href="#">TW-03218-35</a>	<a href="#">TW-32044-34</a>	—	<a href="#">TW-32046-35</a>
<b>High-flow flowmeters</b>					
<a href="#">TW-03216-36</a>	—	<a href="#">TW-03218-37</a>	<a href="#">TW-32044-36</a>	—	—
<a href="#">TW-03216-38</a>	<a href="#">TW-03293-38</a>	<a href="#">TW-03218-39</a>	<a href="#">TW-32044-38</a>	—	<a href="#">TW-32046-39</a>
<a href="#">TW-03216-40</a>	<a href="#">TW-03293-40</a>	<a href="#">TW-03218-41</a>	<a href="#">TW-32044-40</a>	<a href="#">TW-32045-40</a>	<a href="#">TW-32046-41</a>

**Tripod Bases**

Securely stand up to three flowmeters in any combination. Three leveling screws and spirit level are built into a clear acrylic base.



Catalog number	Number of meters held	Price
<a href="#">TW-03226-10</a>	One	
<a href="#">TW-03226-30</a>	One, two, or three	

**TW-30904-01 Fitting:** NPT(M) to barbed adapter, brass, 1/8" x 1/4"

**TW-31412-34 Fitting:** NPT(M) to compression adapter, brass, 1/8" x 1/8"

**TW-31406-34 Fitting:** NPT(M) to compression adapter, SS, 1/8" x 1/8"

**TW-30621-30 Fitting:** NPT(M) to barbed adapter, SS, 1/8" x 1/8"



# Flowmeters

## Variable Area, Correlated

### Cole-Parmer 150-mm Flowmeters

Longer 150-mm scale makes these flowmeters perfect for applications demanding high resolution

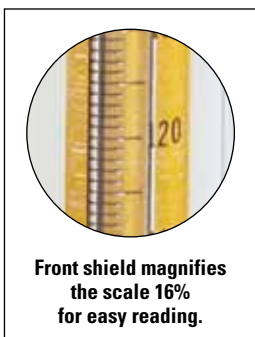
- Ceramic millimeter scale is fused directly to flowtube
- A vertical tangential locator line ensures hairline accuracy in reading float position
- 16-turn high-precision valve features a “nonrising stem” to more accurately set your desired flow point

Each flowmeter consists of a heavy-walled glass flowtube mounted in a frame with white acrylic back plate (1/8" thick). Aluminum flowmeters are economical and good for general use with noncorrosive gases and liquids. Brass flowmeters are economical and good for use with water. The 316 stainless steel flowmeters feature excellent chemical compatibility. Select a flowmeter with a high-precision valve for superior flow rate control—ideal for low-flow applications, for metering samples, and calibration gases for gas analyzers.

All flowmeters come with correlation data sheets for water and air at standard temperature and pressure (STP). We can also supply calibration data for oxygen, nitrogen, hydrogen, helium, CO<sub>2</sub>, argon, other liquids and gases, and for conditions other than STP—call your local dealer for more information.



Aluminum flowmeter 03267-00 without valve



Front shield magnifies the scale 16% for easy reading.

#### MORE online!

For pressure drop information for these flowmeters, go to . . .

[ColeParmer.com](http://ColeParmer.com)

#### Specifications

**Accuracy:** ±5% full-scale for meters with rate of 0.19 and 0.94 mL/min H<sub>2</sub>O  
±2% full-scale for remaining

**Repeatability:** ±0.25% full-scale

**Max pressure:** 200 psi (13.7 bar)

**Operating temp:**  
-15 to 250°F (-26 to 121°C)

**Connections:** 1/8" NPT(F)

ISO9001:2008  
CERTIFIED SUPPLIER



#### Materials of Construction

Part	Aluminum	Brass	SS
Flowtube	Borosilicate glass		
Fittings, valves	Aluminum	Chrome-plated brass	316 SS
O-rings	Buna N		Viton®
Float	Glass, 316 SS, or carboly		
Shield	Polycarbonate		
Frame	Aluminum/acrylic		

Maximum flow rate (mL/min) <sup>†</sup>								Float <sup>††</sup>	Correlated meters without valves		
H <sub>2</sub> O <sup>†</sup>	Air <sup>†</sup>	O <sub>2</sub>	N <sub>2</sub>	H <sub>2</sub>	He	CO <sub>2</sub>	Ar		Aluminum	Brass	316 SS
									Cat. no.	Cat. no.	Cat. no.
0.19	18.7	17	20	37	16	23.6	15.4	G	<a href="#">TW-03267-00</a>	<a href="#">TW-03269-50</a>	<a href="#">TW-03269-01</a>
0.49	49.1	42	48	94	46.2	56.4	43.5	G	<a href="#">TW-03267-04</a>	<a href="#">TW-03269-54</a>	<a href="#">TW-03269-05</a>
0.85	92	81	92	208	90.1	103.1	75.6	G	<a href="#">TW-03267-08</a>	—	<a href="#">TW-03269-09</a>
0.94	60.5	54	62	123	53	72	49	SS	<a href="#">TW-03267-02</a>	<a href="#">TW-03269-52</a>	<a href="#">TW-03269-03</a>
2.45	137	131	143	301	133	150	113	SS	<a href="#">TW-03267-06</a>	—	<a href="#">TW-03269-07</a>
4.74	264	233	271	627	283	281	218	SS	<a href="#">TW-03267-09</a>	—	<a href="#">TW-03269-16</a>
5.5	374	340	382	1021	450	355	305	G	<a href="#">TW-03267-15</a>	<a href="#">TW-03269-62</a>	<a href="#">TW-03269-18</a>
16.5	844	772	827	2620	1490	725	687	G	<a href="#">TW-03267-16</a>	<a href="#">TW-03269-66</a>	<a href="#">TW-03269-17</a>
20.4	814	753	824	2496	1290	728	676	SS	<a href="#">TW-03267-17</a>	—	<a href="#">TW-03269-15</a>
46	1682	1545	1662	5547	3397	1420	1380	SS	<a href="#">TW-03267-18</a>	<a href="#">TW-03269-68</a>	<a href="#">TW-03269-19</a>
53.5	2313	2169	2395	7817	4880	2048	1949	G	<a href="#">TW-03267-20</a>	<a href="#">TW-03269-70</a>	<a href="#">TW-03269-21</a>
84	3807	3485	3868	13,105	7803	3374	3151	G	<a href="#">TW-03267-24</a>	<a href="#">TW-03269-74</a>	<a href="#">TW-03269-25</a>
134	4562	4341	4685	15,855	9770	3990	3903	SS	<a href="#">TW-03267-22</a>	<a href="#">TW-03269-72</a>	<a href="#">TW-03269-23</a>
210	8678	8269	8916	29,840	19,426	7485	7366	G	<a href="#">TW-03267-28</a>	<a href="#">TW-03269-78</a>	<a href="#">TW-03269-29</a>
217	7825	6992	7722	27,804	15,960	6308	6384	SS	<a href="#">TW-03267-26</a>	<a href="#">TW-03269-76</a>	<a href="#">TW-03269-27</a>
506	16,737	15,710	17,021	59,996	38,576	14,051	14,131	SS	<a href="#">TW-03267-30</a>	<a href="#">TW-03269-80</a>	<a href="#">TW-03269-31</a>
<b>Price</b>											
High-flow flowmeters											
541	23,742	21,350	23,512	85,812	53,100	18,989	19,761	G	<a href="#">TW-03267-32</a>	<a href="#">TW-03269-82</a>	—
1288	45,227	39,567	43,000	159,699	103,647	34,287	45,227	SS	<a href="#">TW-03267-34</a>	<a href="#">TW-03269-84</a>	<a href="#">TW-03269-35</a>
1881	66,346	54,902	59,580	221,872	146,500	46,311	47,890	C	<a href="#">TW-03267-36</a>	<a href="#">TW-03269-86</a>	<a href="#">TW-03269-37</a>
<b>Price</b>											

<sup>†</sup>Correlation data sheets for water and air are included with flowmeters.

<sup>††</sup>Flow rates are at standard temperature and pressure (70°F and 14.7 psi). Minimum flow rate is approx 10% of the maximum flow rate.

<sup>†††</sup>Float material key: G = glass, SS = 316 stainless steel, C = carboly



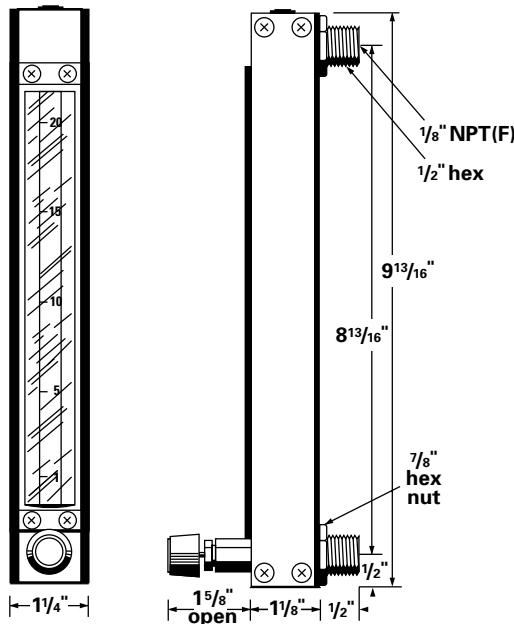
**INNOCAL®**  
INNOVATIVE CALIBRATION SOLUTIONS

**Ensure the accuracy of your flowmeter!**

[TW-17080-00](#) NIST-traceable calibration with data for air/gas flowmeter  
[TW-17080-12](#) NIST-traceable calibration with data for liquid flowmeter

**To Panel Mount**

Drill two holes to fit inlet and outlet according to the diagrams below. Face width is 1 1/4". Secure flowmeter with the two retaining hex nuts (included).



**316 SS flowmeter**  
03229-01 with high-resolution valve

**Brass flowmeter**  
03294-16 with valve

Correlated meters with valves			Correlated meters with high-resolution valves		
Aluminum	Brass	316 SS	Aluminum	Brass	316 SS
Cat. no.	Cat. no.	Cat. no.	Cat. no.	Cat. no.	Cat. no.
<a href="#">TW-03217-00</a>	<a href="#">TW-03294-00</a>	<a href="#">TW-03219-01</a>	<a href="#">TW-03227-00</a>	<a href="#">TW-03295-00</a>	<a href="#">TW-03229-01</a>
<a href="#">TW-03217-04</a>	<a href="#">TW-03294-04</a>	<a href="#">TW-03219-05</a>	<a href="#">TW-03227-04</a>	<a href="#">TW-03295-04</a>	<a href="#">TW-03229-05</a>
<a href="#">TW-03217-08</a>	<a href="#">TW-03294-08</a>	<a href="#">TW-03219-09</a>	<a href="#">TW-03227-08</a>	<a href="#">TW-03295-08</a>	<a href="#">TW-03229-09</a>
<a href="#">TW-03217-02</a>	<a href="#">TW-03294-02</a>	<a href="#">TW-03219-03</a>	<a href="#">TW-03227-02</a>	<a href="#">TW-03295-02</a>	<a href="#">TW-03229-03</a>
<a href="#">TW-03217-06</a>	<a href="#">TW-03294-06</a>	<a href="#">TW-03219-07</a>	<a href="#">TW-03227-06</a>	<a href="#">TW-03295-06</a>	<a href="#">TW-03229-07</a>
<a href="#">TW-03217-10</a>	<a href="#">TW-03294-10</a>	<a href="#">TW-03219-11</a>	<a href="#">TW-03227-10</a>	<a href="#">TW-03295-10</a>	<a href="#">TW-03229-11</a>
<a href="#">TW-03217-12</a>	<a href="#">TW-03294-12</a>	<a href="#">TW-03219-13</a>	<a href="#">TW-03227-12</a>	<a href="#">TW-03295-12</a>	<a href="#">TW-03229-13</a>
<a href="#">TW-03217-16</a>	<a href="#">TW-03294-16</a>	<a href="#">TW-03219-17</a>	<a href="#">TW-03227-16</a>	<a href="#">TW-03295-16</a>	<a href="#">TW-03229-17</a>
<a href="#">TW-03217-14</a>	<a href="#">TW-03294-14</a>	<a href="#">TW-03219-15</a>	<a href="#">TW-03227-14</a>	<a href="#">TW-03295-14</a>	<a href="#">TW-03229-15</a>
<a href="#">TW-03217-18</a>	<a href="#">TW-03294-18</a>	<a href="#">TW-03219-19</a>	<a href="#">TW-03227-18</a>	<a href="#">TW-03295-18</a>	<a href="#">TW-03229-19</a>
<a href="#">TW-03217-20</a>	<a href="#">TW-03294-20</a>	<a href="#">TW-03219-21</a>	<a href="#">TW-03227-20</a>	<a href="#">TW-03295-20</a>	<a href="#">TW-03229-21</a>
<a href="#">TW-03217-24</a>	<a href="#">TW-03294-24</a>	<a href="#">TW-03219-25</a>	<a href="#">TW-03227-24</a>	<a href="#">TW-03295-24</a>	<a href="#">TW-03229-25</a>
<a href="#">TW-03217-22</a>	<a href="#">TW-03294-22</a>	<a href="#">TW-03219-23</a>	<a href="#">TW-03227-22</a>	<a href="#">TW-03295-22</a>	<a href="#">TW-03229-23</a>
<a href="#">TW-03217-28</a>	<a href="#">TW-03294-28</a>	<a href="#">TW-03219-29</a>	<a href="#">TW-03227-28</a>	<a href="#">TW-03295-28</a>	<a href="#">TW-03229-29</a>
<a href="#">TW-03217-26</a>	<a href="#">TW-03294-26</a>	<a href="#">TW-03219-27</a>	<a href="#">TW-03227-26</a>	<a href="#">TW-03295-26</a>	<a href="#">TW-03229-27</a>
<a href="#">TW-03217-30</a>	<a href="#">TW-03294-30</a>	<a href="#">TW-03219-31</a>	<a href="#">TW-03227-30</a>	<a href="#">TW-03295-30</a>	<a href="#">TW-03229-31</a>
<b>High-flow flowmeters</b>					
<a href="#">TW-03217-32</a>	<a href="#">TW-03294-32</a>	<a href="#">TW-03219-33</a>	<a href="#">TW-03227-32</a>	<a href="#">TW-03295-32</a>	<a href="#">TW-03229-33</a>
<a href="#">TW-03217-34</a>	<a href="#">TW-03294-34</a>	<a href="#">TW-03219-35</a>	<a href="#">TW-03227-34</a>	<a href="#">TW-03295-34</a>	<a href="#">TW-03229-35</a>
<a href="#">TW-03217-36</a>	<a href="#">TW-03294-36</a>	<a href="#">TW-03219-37</a>	<a href="#">TW-03227-36</a>	<a href="#">TW-03295-36</a>	<a href="#">TW-03229-37</a>

**Tripod Bases**

Securely stand up to three flowmeters in any combination. Three leveling screws and spirit level are built into a clear acrylic base.



Catalog number	Number of meters held	Price
<a href="#">TW-03226-10</a>	One	
<a href="#">TW-03226-30</a>	One, two, or three	

- [TW-30904-01](#) Fitting; NPT(M) to barbed adapter, brass, 1/8" x 1/4"
- [TW-31412-34](#) Fitting; NPT(M) to compression adapter, brass, 1/8" x 1/8"
- [TW-31406-34](#) Fitting; NPT(M) to compression adapter, SS, 1/8" x 1/8"
- [TW-30621-30](#) Fitting; NPT(M) to barbed adapter, SS, 1/8" x 1/8"



# Flowmeters

## Variable Area, Correlated

### Cole-Parmer 65-mm Flowmeters with PTFE Components

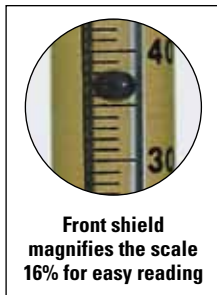
Designed for high-purity applications with flexibility for a broad array of gases

- Compact design is ideal for small panels or cramped workspaces
- High turndown—minimum flow rate is less than one-tenth of maximum flow
- High-precision valve option allows monitoring and control

The substitution of metal fittings with PTFE eliminates a potential contamination source for high-purity applications. The glass tube utilizes a fused ceramic scale for a precise, permanent measuring guide. In addition, a vertical-tangential locator line provides readings with hairline accuracy. Further improving readability is a front shield that magnifies the scale 16%. An anodized aluminum frame protects the heavy-walled glass flowtube; a white acrylic backplate protects and enhances viewing in the protective frame.

Select a flowmeter with a valve for flow rate control. The standard valve is suitable where high resolution metering is not essential. The high-resolution valve features a fine-adjust 16-turn “non-rising stem” to more accurately set your desired flow rate.

All flowmeters come with correlation data sheets for water and numerous gases (listed below) at standard temperature and pressure (STP).



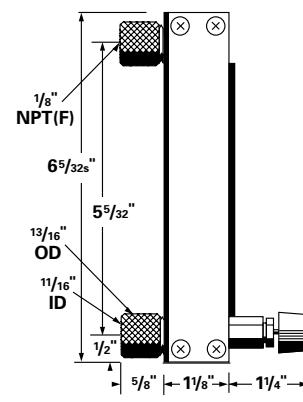
Front shield magnifies the scale 16% for easy reading



65-mm PTFE flowmeter 03216-50 with valve

#### To Panel Mount

Drill two holes to fit the inlet and outlet according to the diagram at left. Face width is 1¼" (3.2 cm). Secure flowmeter with the two retaining nuts (included).



#### Specifications

**Accuracy:** ±5% full-scale for meters with rate of 0.084 mL/min H<sub>2</sub>O  
±2% full-scale for remaining

**Repeatability:** ±0.25% full-scale

**Max pressure:** 100 psi (6.9 bar)

**Operating temp:** -15 to 150°F (-26 to 65°C)

**Connections:** ½" NPT(F)

ISO9001:2008  
CERTIFIED SUPPLIER



#### Materials of Construction

Part	Material
Flowtube	Borosilicate glass
Fittings, valves	PTFE/PCTFE
O-rings	PTFE
Float	PTFE
Frame	Aluminum

Maximum flow rate (mL/min) <sup>†</sup>								Float <sup>††</sup>	Flowmeters without valves	Flowmeters with valves	Flowmeters with high-resolution valves
H <sub>2</sub> O <sup>†</sup>	Air <sup>†</sup>	O <sub>2</sub>	N <sub>2</sub>	H <sub>2</sub>	He	CO <sub>2</sub>	Ar		Catalog number	Catalog number	Catalog number
0.084	8.3	7.1	8.5	15.3	7.9	10	7.7	Sa	<a href="#">TW-03266-50</a>	<a href="#">TW-03216-50</a>	<a href="#">TW-32044-50</a>
0.55	48.7	46	51	99	47	59.2	38	G	<a href="#">TW-03266-52</a>	<a href="#">TW-03216-52</a>	<a href="#">TW-32044-52</a>
0.98	72.3	72	78	150	71	90	63	Sa	<a href="#">TW-03266-55</a>	<a href="#">TW-03216-55</a>	<a href="#">TW-32044-55</a>
1.75	104	94	113	284	99	122	86	G	<a href="#">TW-03266-57</a>	<a href="#">TW-03216-57</a>	<a href="#">TW-32044-57</a>
3.44	159	147	167	435	157	181	131	Sa	—	<a href="#">TW-03216-60</a>	<a href="#">TW-32044-60</a>
2.6	202.1	189	215	502	211	221	174.2	G	—	<a href="#">TW-03216-62</a>	<a href="#">TW-32044-62</a>
4.7	300	279	312	788	327	307	257	Sa	<a href="#">TW-03266-65</a>	<a href="#">TW-03216-65</a>	<a href="#">TW-32044-65</a>
20.5	986	970	1015	3218	1903	883	829	G	<a href="#">TW-03266-67</a>	<a href="#">TW-03216-67</a>	<a href="#">TW-32044-67</a>
34	1299	1217	1321	4215	2606	1143	1095	Sa	<a href="#">TW-03266-70</a>	<a href="#">TW-03216-70</a>	<a href="#">TW-32044-70</a>
36.7	1623	1575	1710	5470	2950	1500	1395	Sa	—	<a href="#">TW-03216-75</a>	—
39.7	2040	1928	2091	6359	3470	1794	1784	G	<a href="#">TW-03266-77</a>	<a href="#">TW-03216-77</a>	<a href="#">TW-32044-77</a>
61	2704	2522	2859	9130	4932	2314	2279	Sa	<a href="#">TW-03266-80</a>	<a href="#">TW-03216-80</a>	<a href="#">TW-32044-80</a>
147	6318	5880	6380	21,712	13,750	5470	5290	G	<a href="#">TW-03266-82</a>	<a href="#">TW-03216-82</a>	<a href="#">TW-32044-82</a>
217	8145	7640	8280	28,211	18,500	6980	6900	Sa	—	<a href="#">TW-03216-85</a>	—
309	13,153	12,341	13,412	47,100	29,762	11,156	11,125	G	<a href="#">TW-03266-87</a>	<a href="#">TW-03216-87</a>	<a href="#">TW-32044-87</a>
<b>Price</b>											

#### High-flow flowmeters

522	23,169	21,686	23,506	80,752	51,380	19,379	19,817	G	<a href="#">TW-03266-88</a>	<a href="#">TW-03216-88</a>	<a href="#">TW-32044-88</a>
798	29,218	27,901	30,337	106,000	67,754	24,630	24,597	Sa	<a href="#">TW-03266-90</a>	<a href="#">TW-03216-90</a>	<a href="#">TW-32044-90</a>
<b>Price</b>											

<sup>†</sup>Correlation data sheets for water and air are included with flowmeters.

<sup>††</sup>Flow rates are at standard temperature and pressure (70°F and 14.7 psi). Minimum flow rate is approx 10% of the maximum flow rate. <sup>††</sup>Float material key: G = glass, Sa = sapphire

#### Tripod Bases

Securely stand up to three flowmeters in any combination. Three leveling screws and spirit level are built into a clear acrylic base.

Catalog number	Number of meters held	Price
<a href="#">TW-03226-10</a>	One	
<a href="#">TW-03226-30</a>	One, two, or three	



#### Find MORE!

For fittings, see pages 509–575.  
For tubing, see pages 1823–1859.



**Cole-Parmer® 150-mm Flowmeters with PTFE Components**

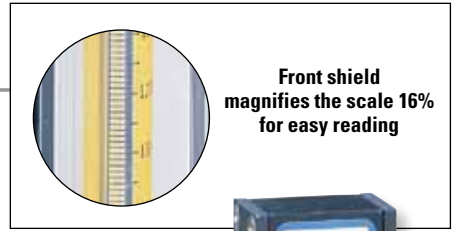
Designed for high-purity applications with flexibility for a broad array of gases

- Longer scale improves control resolution and readability for critical applications
- High turndown—minimum flow rate is less than one-tenth of maximum flow
- High-precision valve option allows monitoring and control

The substitution of metal fittings with PTFE eliminates a potential contamination source for high-purity applications. The glass tube utilizes a fused ceramic scale for a precise, permanent measuring guide. In addition, a vertical tangential locator line provides readings with hairline accuracy. Further improving readability is a front shield that magnifies the scale 16%. An anodized aluminum frame protects the heavy-walled glass flowtube; a white acrylic backplate protects and enhances viewing in the protective frame.

Select a flowmeter with a valve for flow rate control. The standard valve is suitable where high resolution metering is not essential. The high-resolution valve features a fine-adjust 16-turn "nonrising stem" to more accurately set your desired flow rate.

All flowmeters come with correlation data sheets for water and numerous gases (listed below) at standard temperature and pressure (STP).



Front shield magnifies the scale 16% for easy reading

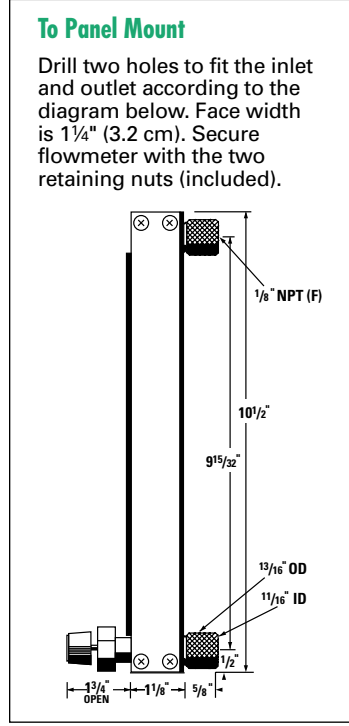
**Specifications**

- Accuracy:** ±2% full-scale
- Repeatability:** ±0.25% full-scale
- Max pressure:** 100 psi (6.9 bar)
- Operating temp:** -15 to 150°F (-26 to 65°C)
- Connections:** 1/8" NPT(F)



**Materials of Construction**

Flowtube	Borosilicate glass
Fittings, valves	PTFE/PTCFE
O-rings	PTFE
Float	Glass or sapphire
Shield	Polycarbonate
Frame	Aluminum/acrylic



150-mm PTFE flowmeter 03217-55 with valve

Maximum flow rate (mL/min) <sup>†</sup>									Float <sup>††</sup>	Flowmeters without valves	Flowmeters with valves	Flowmeters with high-resolution valves
H <sub>2</sub> O <sup>†</sup>	Air <sup>†</sup>	O <sub>2</sub>	N <sub>2</sub>	H <sub>2</sub>	He	CO <sub>2</sub>	Ar	Catalog number		Catalog number	Catalog number	
0.39	30	27	31	59	26	36.8	24.5	Sa	<a href="#">TW-03267-50</a>	<a href="#">TW-03217-50</a>	<a href="#">TW-03217-52</a>	
0.53	49	49	56	100	47	56.8	43.5	G	<a href="#">TW-03267-52</a>	<a href="#">TW-03217-51</a>	<a href="#">TW-03217-53</a>	
0.85	92	81	92	208	90.1	103.1	75.6	G	<a href="#">TW-03267-57</a>	<a href="#">TW-03217-56</a>	<a href="#">TW-03217-58</a>	
0.99	73	70	76	149	69	84	60.1	Sa	<a href="#">TW-03267-55</a>	<a href="#">TW-03217-55</a>	<a href="#">TW-03217-57</a>	
1.92	140	121	139	322	142	157	110.9	Sa	<a href="#">TW-03267-60</a>	<a href="#">TW-03217-60</a>	<a href="#">TW-03217-62</a>	
5.5	374	340	382	1021	450	355	305	G	<a href="#">TW-03267-62</a>	<a href="#">TW-03217-61</a>	<a href="#">TW-03217-63</a>	
9.9	513	472	520	1497	681	472	429	Sa	<a href="#">TW-03267-65</a>	<a href="#">TW-03217-65</a>	<a href="#">TW-03217-67</a>	
16.5	825	772	827	2620	1490	725	687	G	<a href="#">TW-03267-67</a>	<a href="#">TW-03217-66</a>	<a href="#">TW-03217-68</a>	
26.1	1093	1024	1110	3546	2059	944	910	Sa	<a href="#">TW-03267-70</a>	<a href="#">TW-03217-70</a>	<a href="#">TW-03217-72</a>	
53.5	2313	2169	2395	7817	4880	2048	1949	G	<a href="#">TW-03267-72</a>	<a href="#">TW-03217-71</a>	<a href="#">TW-03217-79</a>	
77.8	3079	2860	3142	10,455	6458	2620	2605	Sa	<a href="#">TW-03267-75</a>	<a href="#">TW-03217-75</a>	<a href="#">TW-03217-73</a>	
84	3807	3485	3868	13,105	7803	3374	3151	G	<a href="#">TW-03267-77</a>	<a href="#">TW-03217-77</a>	<a href="#">TW-03217-83</a>	
126	5005	4652	5090	16,108	10,336	4388	4175	Sa	<a href="#">TW-03267-80</a>	<a href="#">TW-03217-80</a>	<a href="#">TW-03217-74</a>	
210	8678	8269	8916	29,840	19,426	7485	7366	G	<a href="#">TW-03267-82</a>	<a href="#">TW-03217-81</a>	<a href="#">TW-03227-84</a>	
306	11,356	10,706	11,524	40,006	25,400	9557	9539	Sa	<a href="#">TW-03267-85</a>	<a href="#">TW-03217-85</a>	<a href="#">TW-03217-76</a>	
<b>Price</b>												
<b>High-flow flowmeters</b>												
541	22,536	21,350	23,512	85,812	53,100	18,989	19,761	G	<a href="#">TW-03267-87</a>	<a href="#">TW-03217-87</a>	<a href="#">TW-03227-87</a>	
806	29,560	27,181	29,930	110,101	70,100	23,855	24,563	Sa	<a href="#">TW-03267-90</a>	<a href="#">TW-03217-90</a>	<a href="#">TW-03217-78</a>	
<b>Price</b>												

<sup>†</sup>Correlation data sheets for water and air are included with flowmeters.  
<sup>††</sup>Flow rates are at standard temperature and pressure (70°F and 14.7 psi). Minimum flow rate is approx 10% of the maximum flow rate.  
<sup>†††</sup>Float material key: G = glass, Sa = sapphire

**INNOCAL®**  
INNOVATIVE CALIBRATION SOLUTIONS

**Ensure the accuracy of your flowmeter!**

[TW-17080-00](#) NIST-traceable calibration with data for air/gas flowmeter  
[TW-17080-12](#) NIST-traceable calibration with data for liquid flowmeter

# Flowmeters

## Variable Area, Correlated

### Benchtop Flowmeters with PTFE Fittings

Design makes each meter suitable for a broad range of laboratory applications

- Modular components allow for meter flexibility across a wide range of flow rates
- Multiple end connections to suit process requirements
- Correlated scaling for interchangeability among multiple fluids

**Unshielded Flowmeters** work well in low-pressure applications. Connect the flowtube end directly to tubing having the proper inner diameter—flowtube outer diameters are listed below. Glass taper joints are an alternate connection option which slip on the PTFE stops that contain the float (contact our Application Specialists to order the glass taper joints).

**Shielded Flowmeters** are better suited to higher-pressure applications or for installations requiring a panel-mounted flowmeter. End bushings are molded with dual connection capability—tubing or threaded; listed below are the appropriate tubing and threaded connections provided with each meter.

**Shielded Flowmeters with Valves** offer flow monitoring along with precise control through an integrated 20-turn micrometer valve. The valve can be adjusted from 0.1 to 100% of maximum flow (semilogarithmic) and provides precise regulation from 0.3 to 60% of maximum flow.

Computer-calibrated flow charts are included for floats used with both air and water at standard temperature and pressure. An “R factor” chart and formulas are included to convert scale readings for other gases or liquids or for floats other than glass. Order the flow rate analysis software below to generate flow charts specific to other applications.



#### Materials of Construction

Part	Unshielded	Shielded	Shielded with valve
Tube	Borosilicate glass		
O-rings	Viton®		
Inserts	PTFE	—	
Body	—	PTFE	
Couplings	—	Polypropylene (PP) with PTFE Inserts†	
Shield	—	Polycarbonate	
Valve	—	Glass chamber with PCTFE plug‡	

†Order PTFE Couplings (below) for a full PTFE coupling.  
‡Tube sizes 14 and 15 have PTFE plug.

#### Dimensions

Tube size(s)	Unshielded	Shielded	Shielded with valves
Micro	5 <sup>1</sup> / <sub>8</sub> "H x 3 <sup>1</sup> / <sub>16</sub> "OD	8"H x 1"OD	8 <sup>1</sup> / <sub>8</sub> "H x 6"H x 1 <sup>1</sup> / <sub>16</sub> "OD
0, 1, 2	7 <sup>1</sup> / <sub>2</sub> "H x 5 <sup>1</sup> / <sub>16</sub> "OD	10 <sup>1</sup> / <sub>4</sub> "H x 1"OD	11"H x 6"W x 1 <sup>1</sup> / <sub>16</sub> "OD
3	7 <sup>1</sup> / <sub>2</sub> "H x 7 <sup>1</sup> / <sub>16</sub> "OD	—	—
4	9"H x 1 <sup>1</sup> / <sub>16</sub> "OD	13 <sup>1</sup> / <sub>4</sub> "H x 1 <sup>1</sup> / <sub>2</sub> "OD	14 <sup>1</sup> / <sub>2</sub> "H x 6"W x 1 <sup>1</sup> / <sub>16</sub> "OD
5	9"H x 1 <sup>1</sup> / <sub>16</sub> "OD	—	—
6	—	15 <sup>1</sup> / <sub>2</sub> "H x 1 <sup>3</sup> / <sub>4</sub> "OD	—

#### Specifications



#### Accuracy

Micro tube size: ±5% of reading or ±2% of scale, whichever is greater; for water, ±10% of reading or ±3 scale divisions, whichever is greater  
All other tube sizes: ±2% of reading or ±1 scale division, whichever is greater

**Repeatability:** ±1% of reading or 1/2 scale graduation, whichever is greater

**Max operating temp:** 150°F (65°C)

**Connections** (for shielded flowmeters)  
Tube sizes micro, 0, 1, 2, 3: 3/8" ID tubing  
Tube sizes 4, 5, 6: 5/8" ID tubing

Flow ranges		Floats†	Tube size	Unshielded flowmeters			Shielded flowmeters				Shielded flowmeters with valves			
Air (mL/min)	Water (mL/min)			Catalog number	Max psi	Price	Catalog number	Ports** NPT	Max psi	Price	Catalog number	Ports** NPT	Max psi	Price
0.02 to 15	0.0002 to 0.12	Ruby	Micro	<a href="#">TW-03210-00</a>	15	—	<a href="#">TW-03210-20</a>	1/4"	125	—	<a href="#">TW-03234-50</a>	1/8" (M)	125	—
0.2 to 100	0.002 to 1.1	Glass	0	<a href="#">TW-03201-02</a>	15	—	<a href="#">TW-03201-22</a>	1/4"	125	—	<a href="#">TW-03234-10</a>	1/8" (M)	125	—
0.36 to 180	0.004 to 2.3	316 SS	0	—	—	—	—	—	—	—	—	—	—	—
1 to 280	0.01 to 4.0	Glass	1	<a href="#">TW-03201-00</a>	15	—	<a href="#">TW-03201-20</a>	1/4"	125	—	<a href="#">TW-03234-11</a>	1/8" (M)	125	—
2 to 500	0.02 to 8.6	316 SS	1	—	—	—	—	—	—	—	—	—	—	—
10 to 1900	0.2 to 36	Glass	2	<a href="#">TW-03202-00</a>	15	—	<a href="#">TW-03202-20</a>	1/4"	100	—	<a href="#">TW-03234-12</a>	1/8" (M)	100	—
20 to 3400	0.43 to 77	316 SS	2	—	—	—	—	—	—	—	—	—	—	—
200 to 14,000	3 to 300	Glass	3	<a href="#">TW-03203-00</a>	15	—	<a href="#">TW-03203-20</a>	1/4"	75	—	<a href="#">TW-03234-13</a>	1/8" (M)	75	—
360 to 25,000	6 to 640	316 SS	3	—	—	—	—	—	—	—	—	—	—	—
1000 to 36,000	10 to 850	Glass	4	<a href="#">TW-03204-00</a>	15	—	<a href="#">TW-03204-20</a>	1/4"	60	—	—	—	—	—
1800 to 64,000	21 to 1820	316 SS	4	—	—	—	—	—	—	—	—	—	—	—
3000 to 77,000	30 to 1900	Glass	5	<a href="#">TW-03205-00</a>	15	—	<a href="#">TW-03205-20</a>	1/2"	50	—	<a href="#">TW-03234-16</a>	1/4" (M)	50	—
5300 to 137,000	64 to 4100	316 SS	5	—	—	—	—	—	—	—	—	—	—	—
25,000 to 330,000	500 to 8000	Glass	6	—	—	—	<a href="#">TW-03205-22</a>	1/2"	50	—	—	—	—	—
50,000 to 675,000	1500 to 20,000	316 SS	6	—	—	—	—	—	—	—	—	—	—	—

†When using the stainless steel float, refer to the correlation chart (included) for proper readings.  
\*\*Port sizes are relevant only if couplings are removed; otherwise, users should reference information in the specifications list.

#### Flow Rate Analysis Software

generates accurate flow rate tables specific to your fluid, temperature, pressure, density, and viscosity using factory calibration data for the specific Gilmont flow tube used.



[TW-32120-10](#) Flow rate analysis software runs with Windows® 95/98/NT computers; CD-ROM

[TW-03198-00](#) Flowmeter stand kit. Use to mount a flowmeter on a benchtop or wall. Mount valved flowmeters without intermediate support—base accepts two large flowmeters (tube size 4, 5 or 6) or three of the smaller flowmeters (tube size micro, 0, 1, 2, 3). Includes one base, one rod, and two mounting clamps

[TW-03198-10](#) Replacement flowmeter base

[TW-03198-20](#) Replacement rod, 18"L (45.7 cm)

[TW-03198-30](#) Replacement mounting clamp

[TW-03198-40](#) PTFE coupling adapter with Viton O-rings replaces the threaded polypropylene bushings on shielded flowmeters to provide an all-PTFE connection; 1/4" NPT(F) port

[TW-31320-07](#) Fitting; NPT(M) to compression adapter, PFA, 1/8"

[TW-31320-09](#) Fitting; NPT(M) to compression adapter, PFA, 1/4"

[TW-31320-13](#) Fitting; NPT(M) to compression adapter, PFA, 1/2"



**Cole-Parmer Easy-View Correlated Flowmeters**

**Perfect for large and small bench-scale or lab systems**

- Wide 180° viewing angle—view flow tube and float from either front or side
- Rotating shield magnifies tube for precise readings
- Dual-float models have higher flow rates and allow a better than 20:1 turndown ratio

All meters include correlation charts for water and air. Correlation charts for oxygen, nitrogen, hydrogen, carbon dioxide, and helium are available from our Application Specialists upon request. Inlet and outlet ports are located on the back of the flowmeter to keep tubing out of the way. Mount flowmeters vertically on a control panel or bench mount with tripod base (order separately below). Valve included to control flow.

These are ideal for measuring and regulating flow rates for analytical instruments or industrial chemical processes. Common applications include blending, mixing, and gas purging.

**Specifications**

**Media type:** water, air, or gases

**Accuracy**

- 65-mm flowmeters: ±5% full-scale
- 150-mm flowmeters: ±3% full-scale

**Max pressure:** 200 psi (13.7 bar)

**Max operating temp:** 200°F (93°C)

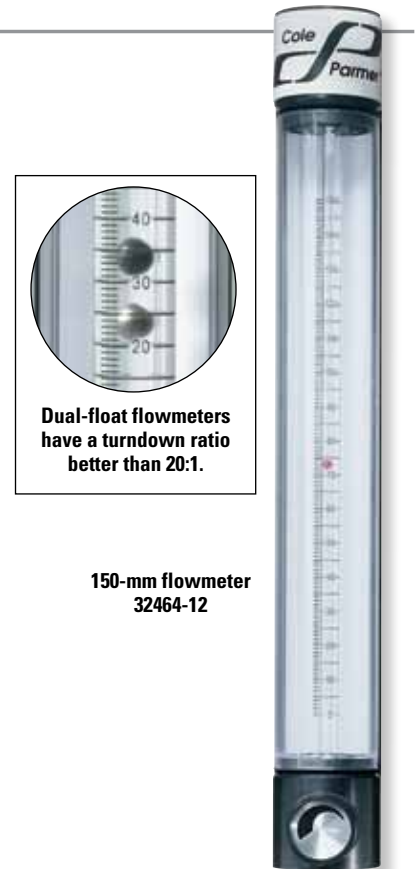
**Connections:** 1/8" NPT(F)

**Dimensions (W x H x D)**

- 65-mm flowmeters: 1 1/4" x 5 1/2" x 2 3/8"  
(3.2 x 14.0 x 6.0 cm)
- 150-mm flowmeters: 1 1/4" x 9 1/16" x 2 3/8"  
(3.2 x 24.9 x 6.0 cm)

**Materials of Construction**

Part	Aluminum	316 SS
Frame, fittings, valves	Aluminum	316 SS
O-rings	Buna N	Viton®
Flowtube	Borosilicate glass	



Dual-float flowmeters have a turndown ratio better than 20:1.

150-mm flowmeter  
32464-12

**65-mm Flowmeters**

Max flow rate (mL/min) <sup>†</sup>							Float(s) <sup>‡</sup>	Aluminum		316 SS	
H <sub>2</sub> O	Air	O <sub>2</sub>	N <sub>2</sub>	H <sub>2</sub>	He	CO <sub>2</sub>		Cat. no.	Price	Cat. no.	Price
<b>Single-float flowmeters</b>											
0.54	50	49	53	102	49	61	G	<a href="#">TW-32463-00</a>		<a href="#">TW-32463-02</a>	
1.23	100	91	106	254	97	115	G	<a href="#">TW-32463-08</a>		—	—
1.28	150	136	159	381	145	172	S	<a href="#">TW-32463-12</a>		<a href="#">TW-32463-14</a>	
6.00	400	368	420	1080	440	408	G	<a href="#">TW-32463-20</a>		<a href="#">TW-32463-22</a>	
30	1175	1116	1210	3748	1997	1046	S	<a href="#">TW-32463-32</a>		<a href="#">TW-32463-34</a>	
55	2500	2375	2550	9525	6725	2025	G	<a href="#">TW-32463-40</a>		<a href="#">TW-32463-42</a>	
146	5000	4750	5100	19,050	13,450	4050	SS	<a href="#">TW-32463-48</a>		<a href="#">TW-32463-50</a>	
240	10,000	9500	10,200	38,100	26,900	8100	G	<a href="#">TW-32463-56</a>		<a href="#">TW-32463-58</a>	
545	20,000	19,000	20,400	96,200	53,800	16,200	S	<a href="#">TW-32463-64</a>		<a href="#">TW-32463-66</a>	
1380	44,425	42,204	45,313	169,259	119,503	35,984	SS	<a href="#">TW-32463-72</a>		—	—

**150-mm Flowmeters**

Max flow rate (mL/min) <sup>†</sup>							Float(s) <sup>‡</sup>	Aluminum		316 SS	
H <sub>2</sub> O	Air	O <sub>2</sub>	N <sub>2</sub>	H <sub>2</sub>	He	CO <sub>2</sub>		Cat. no.	Price	Cat. no.	Price
<b>Single-float flowmeters</b>											
0.55	50	48	53	102	48	61	G	<a href="#">TW-32464-00</a>		<a href="#">TW-32464-02</a>	
2.15	155	141	164	393	150	178	S	<a href="#">TW-32464-12</a>		<a href="#">TW-32464-14</a>	
5.4	295	271	312	776	310	312	SS	<a href="#">TW-32464-16</a>		<a href="#">TW-32464-18</a>	
23	850	807	867	2584	1334	782	SS	<a href="#">TW-32464-24</a>		<a href="#">TW-32464-26</a>	
27.7	1150	1092	1173	3680	1955	1023	S	<a href="#">TW-32464-28</a>		<a href="#">TW-32464-30</a>	
75	2950	2802	3009	11,239	7935	2389	S	<a href="#">TW-32464-36</a>		<a href="#">TW-32464-38</a>	
126	4550	4322	4641	17,335	12,239	3685	S	<a href="#">TW-32464-40</a>		<a href="#">TW-32464-42</a>	
210	6800	6460	6936	25,908	18,292	5508	SS	<a href="#">TW-32464-44</a>		<a href="#">TW-32464-46</a>	
565	19,050	18,097	19,431	72,580	51,244	15,430	SS	<a href="#">TW-32464-52</a>		<a href="#">TW-32464-54</a>	
1415	46,200	43,890	47,124	176,022	124,278	37,422	SS	<a href="#">TW-32464-60</a>		<a href="#">TW-32464-62</a>	
2200	72,600	68,970	74,052	276,606	195,294	58,806	T	<a href="#">TW-32464-64</a>		<a href="#">TW-32464-66</a>	
<b>Dual-float flowmeters</b>											
2.5	152	142	156	340	153	167	G/SS	<a href="#">TW-32466-00</a>		<a href="#">TW-32466-02</a>	
5.4	290	260	300	640	290	300	G/SS	<a href="#">TW-32466-04</a>		<a href="#">TW-32466-06</a>	
22.2	870	820	895	2175	1435	790	G/SS	<a href="#">TW-32466-08</a>		<a href="#">TW-32466-10</a>	
47.5	1700	1610	1745	5100	3535	1490	G/SS	<a href="#">TW-32466-12</a>		<a href="#">TW-32466-14</a>	
125	4430	4170	4500	15,060	9600	3800	G/SS	<a href="#">TW-32466-16</a>		<a href="#">TW-32466-18</a>	
188	6500	6150	6650	23,400	14,600	5600	G/SS	<a href="#">TW-32466-20</a>		<a href="#">TW-32466-22</a>	
500	17,000	16,000	17,250	64,250	38,600	14,200	G/SS	<a href="#">TW-32466-24</a>		<a href="#">TW-32466-26</a>	



65-mm flowmeter  
32463-40  
shown with  
tripod base  
32465-50

**Tripod Base**

[TW-32465-50](#) Tripod base mounts one flowmeter. Includes mounting bracket, leveling screws, and spirit level

<sup>†</sup>Minimum flow rate is approximately 10% of the maximum flow rate using a single-float and 5% using a dual-float.  
<sup>‡</sup>Float material key: G = glass, S = sapphire, SS = stainless steel, and T = tantalum.



# Flowmeters Flow Indicators

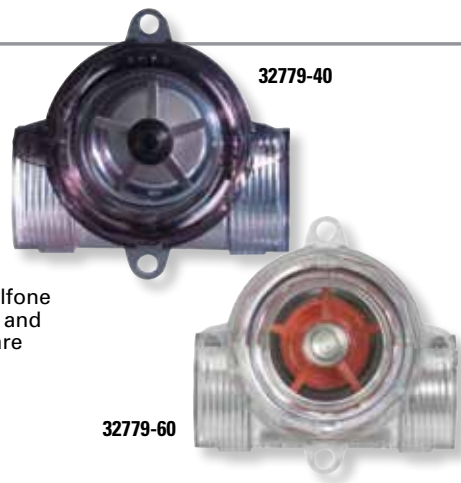
## Sight Flow Indicators and Transmitters

### Easily view flow indicator through clear plastic housing

- Models with 1 to 10 VDC output offer local and remote indication
- No magnets in the rotor to attract ferrous materials
- Output sensors can be added and replaced in the field without removing body from the process line

Sight flow indicators are a low-cost, durable rotor-style flow indicator. Choose from models that provide basic visual flow indication or models with output for remote flow monitoring. Units are constructed of clear plastic, enabling 360° viewing of the spinning rotor for easy flow indication. Models constructed of polysulfone (PSF) have excellent chemical compatibility, high pressure and temperature ratings, and all wetted materials are FDA/NSF rated for potable water applications. Models that are polycarbonate (PC) are constructed of UV-stabilized material making them ideal for outdoor applications (these models do not meet FDA/NSF rating).

Easily replace or switch outputs—install onto an existing indicator body in the field without any tools. Any sensor can be used with any flow indicator.



### Specifications

#### Pulsed output

Accuracy: ±5% full-scale  
Temperature range: -20 to 212°F (-29 to 100°C)  
Power: 8 to 28 VDC  
Output: 5 VDC and 8 to 28 VDC pulse

#### 1 to 10 VDC output

Accuracy: ±5% full-scale  
Temperature range: -20 to 212°F (-29 to 100°C)  
Power: 15 to 28 VDC  
Output: 1 to 10 VDC

#### Two switch outputs

Temperature range: -20 to 212°F (-29 to 100°C)  
Power: 8 to 28 VDC  
Output: 100 mA and 28 VDC max NO/NC switches

Wetted materials						Operating temperature	Maximum pressure	Port size NPT(F)	Flow range GPM (LPM)	Indicators only		Indicators with 1 to 10 VDC output	
Body	Window	Rotor	Rotor pin	Thrust washers	O-ring					Catalog number	Price	Catalog number	Price
PSF	PSF	White PSF	316 SS	300 SS	NSF-grade fluoroelastomer	-20 to 212°F (-29 to 100°C)	150 psi	1/2"	0.5 to 6.5 (1.9 to 24.6)	<a href="#">TW-32779-40</a>		<a href="#">TW-32779-54</a>	
								1/2"	2 to 20 (7.6 to 75.5)	<a href="#">TW-32779-42</a>		<a href="#">TW-32779-56</a>	
								3/4"	3 to 35 (11.4 to 132.5)	<a href="#">TW-32779-44</a>		<a href="#">TW-32779-58</a>	
PC	PC	Red PTB	316 SS	300 SS	Buna N	-20 to 130°F (-29 to 55°C)	125 psi	1/2"	0.5 to 6.5 (1.9 to 24.6)	<a href="#">TW-32779-46</a>		<a href="#">TW-32779-60</a>	
								1/2"	2 to 20 (7.6 to 75.5)	<a href="#">TW-32779-48</a>		<a href="#">TW-32779-62</a>	
								3/4"	3 to 35 (11.4 to 132.5)	<a href="#">TW-32779-52</a>		<a href="#">TW-32779-64</a>	

[TW-32779-66](#) Replacement output sensor, with pulsed output

[TW-32779-68](#) Replacement output sensor, with 1 to 10 VDC output

[TW-32779-70](#) Replacement output sensor, with two switch output

## Cole-Parmer® Flow Indicators for Liquids

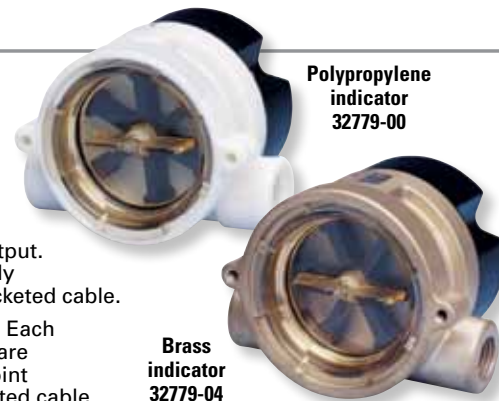
### Models with sensor or switch offer dual functionality

All flow indicators feature a paddle-wheel that spins at a rate proportional to the flow. Lens can be removed with a 1/4 turn for easy cleaning. Use with fluids that have a viscosity less than 34 centipoise (150 µm filter is recommended for protection). Select from indicator, indicator/sensor, or indicator/switch.

**Indicators** feature a bright orange rotor that spins to provide visual verification.

**Indicators/Sensors** feature a Hall-effect sensor that produces a 4.5 to 24 VDC pulse output. Maximum current source output is 70 mA and frequency output range is approximately 25 Hz at low flow to 225 Hz at high flow. Indicator/sensor includes 24" (61.0 cm) PVC jacketed cable.

**Indicators/Switches** offer extra level of reliability and protection with a built-in switch. Each SPDT switch is rated for 1 amp, 24 VDC resistive (0.3 amp 110 VAC indicator/switches are available online). Repeatability is ±2%; accuracy is ±5%. An LED lights when the set point is reached for easy field calibration. Indicator/switches include 24" (61.0 cm) PVC jacketed cable.



### Specifications

**Wetted materials:** polypropylene (PP) or brass, ceramic, PPS, nylon, polysulfone, Buna N (PP models) or Viton® (brass models), and glass-reinforced PP

**Max pressure**  
PP models: 100 psi (6.9 bar) at 70°F (21°C)  
Brass models: 200 psi (13.8 bar) at 70°F (21°C)

**Max operating temp**  
Indicator/switches: 180°F (82°C)  
All other models: 212°F (100°C)

Body material	Port size	Flow range (GPM)		Indicators		Indicator/sensors			Indicator/switches		
		Low†	Standard	Cat. no.	Price	Cat. no.	Power	Price	Cat. no.	Power	Price
Polypropylene	1/4" NPT(F)	0.1 to 1.0	0.5 to 5.0	<a href="#">TW-32779-00</a>		<a href="#">TW-32779-10</a>	4.5 to 24 VDC		<a href="#">TW-32880-20</a>	24 VDC	
	1/2" NPT(F)	1.5 to 12.0	4.0 to 20.0	<a href="#">TW-32779-02</a>		<a href="#">TW-32779-12</a>	4.5 to 24 VDC		<a href="#">TW-32880-32</a>	24 VDC	
Brass	1/4" NPT(F)	0.1 to 1.0	0.5 to 5.0	<a href="#">TW-32779-04</a>		<a href="#">TW-32779-13</a>	4.5 to 24 VDC		<a href="#">TW-32880-50</a>	24 VDC	
	1/2" NPT(F)	1.5 to 12.0	4.0 to 20.0	<a href="#">TW-32779-06</a>		<a href="#">TW-32779-14</a>	4.5 to 24 VDC		—	—	
	3/4" NPT(F)	—	3.0 to 30.0	<a href="#">TW-32779-08</a>		—	—		—	—	
	1" NPT(F)	—	5.0 to 60.0	<a href="#">TW-32779-09</a>		—	—		—	<a href="#">TW-32880-62</a>	

†Using included low-flow adapter



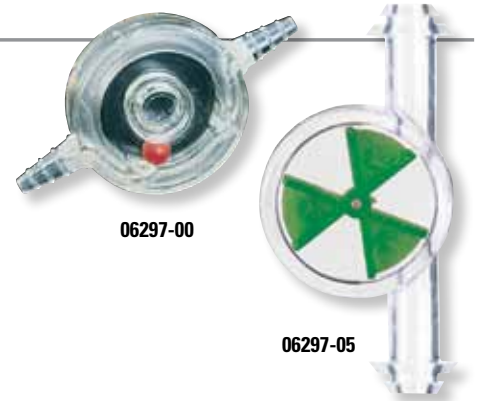
## Flow Indicators for Liquids and Gases

### An inexpensive way to visually monitor flow of liquids and gases

Indicators give visual confirmation of flow through a clear polystyrene housing. All models can be used with noncorrosive liquids and gases. Connect tubing to indicators via hose barb connections; model 06297-05 has straight ends. All models are pressure rated to 10 psig.



Catalog number	Flow range (L/min)	Tubing ID	Indicator type (PP)	Max fluid temperature	Price
<a href="#">TW-06297-00</a>	0.2 to 6.5	1/4" to 3/8"	Ball	125°F (50°C)	
<a href="#">TW-06297-05</a>	0.5 to 10.0	1/4"	Paddle	150°F (65°C)	
<a href="#">TW-06297-06</a>	0.5 to 10.0	3/16" to 1/4"	Paddle	150°F (65°C)	
<a href="#">TW-06297-07</a>	0.5 to 10.0	1/4" to 7/16"	Paddle	150°F (65°C)	



## Sight Flow Transmitters

### Output signal for local and remote indication

These sight flow sensors are designed for low-cost applications where visual indication and sensing output signals are required—available with 4 to 20 mA, pulse, relay, or 0 to 5 VDC output. Durable polypropylene body is compatible with a variety of fluids. Sensors offer a flow measuring accuracy of ±2% full-scale, and are capable of handling pressures up to 150 psig and temperatures up to 150°F (66°C).

### Specifications

**Wetted materials:** glass-filled polypropylene casing, clear polycarbonate cover, Buna N seal, acetal copolymer turbine, PEEK bearing, stainless steel shaft

**Measuring accuracy:** ±2% full-scale

**Repeatability:** ±0.5% full-scale

**Process connection:** 1/2" NPT(F)

**Electrical connection:** 3-wire pigtail, 12 ft (3.6 m)

**Turndown ratio:** 10:1

**Max pressure:** 150 psig (10.3 bar)

**Operating temp:** 20 to 150°F (-7 to 66°C)

**Standard calibration media:** tap water at 70°F (21°C)

**Dimensions (W x H x D):** 3 3/4" x 3 1/2" x 2 1/2"  
(9.5 x 9 x 6.3 cm)



Catalog number	Output type	Flow range	Power	Price
<a href="#">TW-32825-00</a>	4 to 20 mA	0.5 to 5 GPM	12 to 35 VDC	
<a href="#">TW-32825-02</a>		1 to 10 GPM		
<a href="#">TW-32825-04</a>		1.5 to 15 GPM		
<a href="#">TW-32825-06</a>	Pulse	0.5 to 5 GPM	5 to 24 VDC	
<a href="#">TW-32825-08</a>		1 to 10 GPM		
<a href="#">TW-32825-10</a>		1.5 to 15 GPM		
<a href="#">TW-32825-12</a>	Relay	0.5 to 5 GPM	12 to 35 VDC	
<a href="#">TW-32825-14</a>		1 to 10 GPM		
<a href="#">TW-32825-16</a>		1.5 to 15 GPM		
<a href="#">TW-32825-18</a>	0 to 5 VDC	0.5 to 5 GPM	12 to 35 VDC	
<a href="#">TW-32825-20</a>		1 to 10 GPM		
<a href="#">TW-32825-22</a>		1.5 to 15 GPM		
<a href="#">TW-32825-22</a>		1.5 to 15 GPM		

## Industrial Flow Indicators

### Integral cleaning mechanism ensures clear, unobstructed viewing

- Transparent glass cylinder
- Universal mountability

With a simple twist of the sight glass, integral wipers clean the viewing area to allow unobstructed observation of the rotor. The offending contaminants are then simply washed away by the medium flow. This process may be repeated as often as desired—no fuss—no downtime.

The body is made of a hard glass (Duran) and the rotor and wipers are synthetic. The device is kept tight and rotatable through the use of low friction O-rings.

### Specifications

**Max operating temp:** 210°F (98.9°C)

**Max pressure:** 230 psig (15.6 bar)

Indicator with brass fittings						Indicator with SS fittings					
Catalog number	Connection NPT(F)	Length in. (cm)	Max flow (GPM)	Pressure drop <sup>1</sup> (psi)	Price	Catalog number	Connection NPT(F)	Length in. (cm)	Max flow (GPM)	Pressure drop <sup>1</sup> (psi)	Price
<a href="#">TW-32481-62</a>	1/4"	2.76 (7.0)	2.11	0.29		<a href="#">TW-32481-68</a>	1/4"	2.76 (7.0)	2.11	0.29	
<a href="#">TW-32481-63</a>	3/8"	2.76 (7.0)	3.17	0.29		<a href="#">TW-32481-69</a>	3/8"	2.76 (7.0)	3.17	0.29	
<a href="#">TW-32481-61</a>	1/2"	3.35 (8.5)	6.34	0.44		<a href="#">TW-32481-70</a>	1/2"	3.35 (8.5)	6.34	0.44	
<a href="#">TW-32481-64</a>	3/4"	3.74 (9.5)	12.15	2.32		<a href="#">TW-32481-71</a>	3/4"	3.74 (9.5)	12.15	2.32	
<a href="#">TW-32481-65</a>	1"	4.13 (10.5)	17.44	4.06		<a href="#">TW-32481-72</a>	1"	4.13 (10.5)	17.44	4.06	
<a href="#">TW-32481-66</a>	1 1/4"	4.72 (12.0)	29.06	3.63		<a href="#">TW-32481-73</a>	1 1/4"	4.72 (12.0)	29.06	3.63	
<a href="#">TW-32481-67</a>	1 1/2"	5.12 (13.0)	42.27	4.21		<a href="#">TW-32481-74</a>	1 1/2"	5.12 (13.0)	42.27	4.21	

<sup>1</sup>Pressure drop with 6.5 ft/sec

[TW-17080-12](#) NIST-traceable calibration with data



32481-62



# Flowmeters

## Laminar Flow / Gas Mass

### Cole-Parmer® Flowmeters and Proportional Controllers for Gases

#### Versatility and high accuracy from a laminar-based mass flowmeter

- Accuracy of ±0.8% of reading +0.2% full-scale; repeatability of ±0.2%
- Measure 30 standard gases—user selectable from display
- 100 to 1 turndown with ranges of 1 SCCM full-scale up to 1000 SLPM
- Models with 4 to 20 mA output or totalizer are available

These meters measure flow via pressure drop across a laminar flow element (LFE). Because the flow element makes the flow stream laminar, placement in the process does not require straight pipe runs upstream or downstream of the meter, greatly simplifying installation. As compared to thermal mass technologies, the LFE design provides an ultrafast response within 10 milliseconds and offers “instant on” with no warm-up time.

An integrated keypad around the display is all that is required to program the unit for service. The 0 to 5 VDC output allows transmission of the flow value to a remote display, recorder, or controller regulating a valve or pump.

Flow controllers feature an integrated PID to direct the unit’s response to process changes. Flow set point is established with keypad, the optional set point control module, a 0 to 5 V signal, or an RS-232 input signal. Order set point control modules separately from the table. For portable flow metering applications, order the battery pack listed below table.

**What’s included:** 120/230 VAC power adapter with communications cable 32929-89 and NIST-traceable calibration report supplied by the manufacturer.



Mass flowmeter 32908-59 shown with optional battery pack 32929-50



Flow controller 32907-51



Meters and controllers feature a dynamic display that simultaneously shows flow rate, line pressure, fluid temperature, and (for controllers) the set point. For the units shown, both power and input/output signals are transmitted through a single multi-pin connector.

#### Specifications

##### Max particulate size

- Up to 1 LPM: 20 µm
- >1 LPM to 1000 LPM: 50 µm

**Accuracy:** ±0.8% of reading, +0.2% full-scale

**Repeatability:** ±0.2%

##### Response time

- Flowmeters: 10 msec
- Flow controllers: 50 msec

##### Operating temperature:

- 14 to 122°F (-10 to 50°C)

**Max pressure:** 145 psig (9.9 bar)

**Pressure drop:** 0.8 to 3.2 psig (flowmeter)

**Output signal:** 0 to 5 VDC, RS-232

**Input signal:** 0 to 5 VDC and RS-232

##### Wetted materials

- Flowmeters: 302 and 303 SS, Viton®, silicone RTV, and glass-reinforced nylon, aluminum
- Flow controllers: 302, 303; Viton, silicone RTV, glass-reinforced nylon, aluminum, brass, 410 SS, silicon, glass

##### Power

- Flowmeters: 7 to 30 VDC at 30 mA
- Flow controllers
- Models ≤10 LPM: 12 to 30 VDC at 250 mA
- Models ≤50 LPM: 24 to 30 VDC at 750 mA

**Display type:** four-digit, seven-line LCD; ¼”H flow display



“Very versatile flow controller”

Racer, CA



##### Connections

- ≤ 10 mL/min: 10-32 UNF
- 50 mL/min to 10 LPM: ¼” NPT(F)
- 50 to 100 LPM: ¼” NPT(F)
- 100 and 250 LPM: ½” NPT(F)
- 500 and 1000 LPM: ¾” NPT(F)

Flowmeters/controllers†	Dimensions
Models ≤50 mL/min	2¾”L x 3¾”H x 1¼”D (6.0 x 9.8 x 3.2 cm)
Models 100 mL/min to 10 LPM	2¾”L x 4¼”H x 1¼”D (6.0 x 10.8 x 3.2 cm)
Models 50 LPM to 100 LPM	4”L x 4¾”H x 1½”D (10.2 x 11.1 x 4.1 cm)
Models 250 LPM to 1000 LPM	4”L x 5½”H x 1½”D (10.2 x 14.0 x 4.1 cm)
Set point module	2¾”W x 2”H x 1”D (6.0 x 5.1 x 2.5 cm)

†Dimensions do not include control valve.

Flow range	Mass flowmeters		Mass flow controllers		Set point modules‡	
	Catalog number	Price	Catalog number	Price	Catalog number	Price
0.01 to 1 mL/min	<a href="#">TW-32908-51</a>		<a href="#">TW-32907-51</a>		<a href="#">TW-32907-83</a>	
0.05 to 5 mL/min	<a href="#">TW-32908-53</a>		<a href="#">TW-32907-53</a>		<a href="#">TW-32907-85</a>	
0.1 to 10 mL/min	<a href="#">TW-32908-55</a>		<a href="#">TW-32907-55</a>		<a href="#">TW-32907-87</a>	
0.5 to 50 mL/min	<a href="#">TW-32908-57</a>		<a href="#">TW-32907-57</a>		<a href="#">TW-32907-89</a>	
1 to 100 mL/min	<a href="#">TW-32908-59</a>		<a href="#">TW-32907-59</a>		<a href="#">TW-32907-91</a>	
2 to 200 mL/min	<a href="#">TW-32908-61</a>		<a href="#">TW-32907-61</a>		<a href="#">TW-32907-93</a>	
5 to 500 mL/min	<a href="#">TW-32908-63</a>		<a href="#">TW-32907-63</a>		<a href="#">TW-32907-97</a>	
0.01 to 1 LPM	<a href="#">TW-32908-67</a>		<a href="#">TW-32907-67</a>		<a href="#">TW-32907-83</a>	
0.05 to 5 LPM	<a href="#">TW-32908-69</a>		<a href="#">TW-32907-69</a>		<a href="#">TW-32907-85</a>	
0.1 to 10 LPM	<a href="#">TW-32908-71</a>		<a href="#">TW-32907-71</a>		<a href="#">TW-32907-87</a>	
0.5 to 50 LPM	<a href="#">TW-32908-73</a>		<a href="#">TW-32907-73</a>		<a href="#">TW-32907-89</a>	
1 to 100 LPM	<a href="#">TW-32908-75</a>		<a href="#">TW-32907-75</a>		<a href="#">TW-32907-91</a>	
2.5 to 250 LPM	<a href="#">TW-32908-77</a>		<a href="#">TW-32907-77</a>		<a href="#">TW-32907-95</a>	
5 to 500 LPM	<a href="#">TW-32908-79</a>		<a href="#">TW-32907-79</a>		<a href="#">TW-32907-97</a>	
10 to 1000 LPM	<a href="#">TW-32908-81</a>		<a href="#">TW-32907-81</a>		<a href="#">TW-32907-99</a>	

†May be ordered as an option.

[TW-17080-10](#) NIST-traceable recalibration

[TW-32929-50](#) Battery pack, for portable operation of mass or volumetric flowmeter only

[TW-32929-89](#) Replacement communication cable, 8-DIN to stripped ends



**Cole-Parmer® Low-Cost Flowmeters/Flow Transmitters**

**Miniature coil design for fast performance**

- All meters feature 0 to 5 VDC output signal for data logging or controlling other instruments

These low-cost flowmeters use a thermal gas flow sensing technique that results in highly accurate readings and repeatability. See "How it Works" on page 589 for more information on mass flowmeter operation. All units are calibrated to air/nitrogen—call our Application Specialists for meters calibrated to other gases or gas mixtures. Meters feature a cable hub connector for a quick connection to a power supply and 0 to 5 VDC output cable; order power supplies/cables below right. Flowmeters are available without display or with 3½-digit LCD. Display tilts up to 90° for easy viewing.

Flowmeters have low pressure drop across the sensor. The output signal can connect to a remote display, recorder, or any instrument that accepts a 0 to 5 VDC signal. Compact size makes it easy to carry around. Order rechargeable battery kit below right.

Wetted materials are anodized aluminum, 316 stainless steel, Viton® O-rings, and acetal fittings (316 stainless steel fittings on models 32711-36 to -52 and 32712-36 to -52). Each meter includes two compression fittings and a 36" (0.9 m) long cable with hub connector. All have metric-reading scales.



1  
Flowmeter 32707-08

1  
Flowmeter with display 32707-20

**TECHNICAL info!**

**Accuracy:** These precalibrated flowmeters operate at inlet pressures between 5 and 40 psi and at gas temperatures between 64 and 77°F (18 to 25°C) while maintaining the stated ±1.5% full scale accuracy and linearity. When operating beyond 5 to 40 psi, add ±0.02%/psi full-scale; if operating beyond 64 to 77°F (18 to 25°C), add ±0.15%/°C full-scale.

**Specifications**

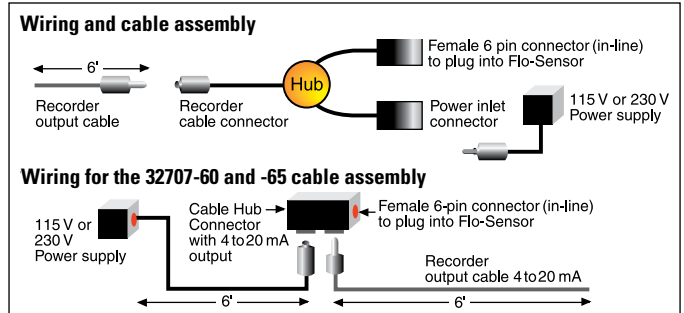
- Max particulate size:** 20 microns
- Accuracy:** ±1.5% full-scale including linearity (see below for details)
- Accuracy coefficient, temperature:** ±0.15% per °C full-scale
- Accuracy coefficient, pressure:** ±0.02% per psi full-scale
- Repeatability:** ±0.5% full scale
- Response time:** 2 seconds (typical) to within ±2% of actual flow rate from 25 to 100% of full scale
- Operating temperature:** 50 to 122°F (10 to 50°C)
- Maximum system pressure:** 150 psi (10.3 bar)
- Leak integrity:** 1 x 10<sup>-4</sup> sccs He (max)
- Transducer input power:** 12.5 to 15 VDC; 100 mA max

- Output signal:** linear 0 to 5 VDC (2500 Ω minimum load)
- Connection fittings**  
Models 32707-00 to -10 and 32707-20 to -30: 1/8" compression fittings  
Models 32707-12, -14 and 32707-32, -34: 1/4" compression fittings  
Models 32707-16, -36, 32711-36, and -40, and 32712-36, and -40: 3/8" compression fittings  
Models 32711-44 to -52 and 32712-44 to -52: 1/2" compression fittings
- Dimensions (W x H x D)** not including fittings  
Models 32707-00 to -36: 1 7/8" x 3 1/2" x 1" (4.8 x 8.9 x 2.5 cm);  
Models 32711-36 to -44 and 32712-36 to -44: 4 1/2" x 4" x 1 1/4" (11.4 x 10.2 x 3.2 cm)  
Models 32711-52 and 32712-52: 5 13/16" x 6" x 3" (14.8 x 15.2 x 7.6 cm)



**REQUIRED SYSTEM Components**

- 1 Flowmeter
- 2 Power supply/cable



**2 Power Supply/Output Cable (required).** The cable provides both power to the flowmeter, and transmits output signals. Select a power supply/output cable for 0 to 5 VDC output signal or for 4 to 20 mA output signal. Both power supply cable and output cable are six feet (1.8 m) long. Order from table below.

**2 Rechargeable Battery Kit** makes your flowmeters portable. Use flow meters for more than 8 hours without recharging. Batteries can be recharged at least 500 times. Kit contains batteries, charger, output cable, and carrying case with shoulder strap. Order from table below.

Flow rate	Pressure drop (max flow)	Without display		With 3½-digit LCD	
		Cat. no.†	Price	Cat. no.‡	Price
<b>1 Flowmeters with acetal fittings</b>					
0 to 20 sccm	1" H <sub>2</sub> O	TW-32707-00		TW-32707-20	
0 to 50 sccm	1" H <sub>2</sub> O	TW-32707-02		TW-32707-22	
0 to 100 sccm	2" H <sub>2</sub> O	TW-32707-04		TW-32707-24	
0 to 200 sccm	2" H <sub>2</sub> O	TW-32707-06		TW-32707-26	
0 to 500 sccm	2" H <sub>2</sub> O	TW-32707-08		TW-32707-28	
0 to 1000 sccm	3" H <sub>2</sub> O	TW-32707-10		TW-32707-30	
0 to 2 sL/min	3" H <sub>2</sub> O	TW-32707-12		TW-32707-32	
0 to 5 sL/min	3" H <sub>2</sub> O	TW-32707-14		TW-32707-34	
0 to 10 sL/min	10" H <sub>2</sub> O	TW-32707-16		TW-32707-36	

<b>1 Flowmeters with stainless steel fittings</b>					
0 to 20 sL/min	3" H <sub>2</sub> O	TW-32711-36		TW-32712-36	
0 to 50 sL/min	10" H <sub>2</sub> O	TW-32711-40		TW-32712-40	
0 to 100 sL/min	10" H <sub>2</sub> O	TW-32711-44		TW-32712-44	
0 to 500 sL/min	50" H <sub>2</sub> O	TW-32711-52		TW-32712-52	

Description	115 VAC models		230 VAC models	
	Cat. no.	Price	Cat. no.	Price
Power supply and output cable (0 to 5 VDC output)	TW-32707-50		TW-32707-55	
Power supply and output cable (4 to 20 mA output)	TW-32707-60		TW-32707-65	
Rechargeable battery kit	TW-32707-70		TW-32707-75	

- TW-32707-85** Cable from meter to existing power supply
- TW-32707-80** Extension cable lengthens flowmeter cable by six additional feet
- TW-17080-10** NIST-traceable recalibration with data

†Add 1½" to the height of models with display.  
‡Power supplies/connectors are required; order separately at right.



# Flowmeters

## Thermal Dispersion / Gas Mass

### Cole-Parmer® Low-Cost Flow Controllers

#### Integrated valve allows precise flow control

- Use the triple-calibrated models for multiple gas applications

These low-cost mass controllers use a thermal gas flow sensing technique that results in highly accurate readings and repeatability. Models 32708-32 through 32708-42 are calibrated for air, helium (He), and argon (Ar) only. Models 32708-00 through 32708-30 are calibrated for air and nitrogen (N<sub>2</sub>) only; models 32708-20 through 32708-30 can be custom calibrated for up to three different gases at an additional charge. Call our Application Specialists for more information.

All models accept a 0 to 5 VDC input signal for remote valve control. Controllers with display also feature a potentiometer for manual valve control. Display is a 3½-digit LCD and tilts up to 90° for easy viewing. Front panel dip switch lets you select one of the factory programmed gases: air, nitrogen, helium, or argon.

**Note:** All controllers **require** a combined power supply/input/output cable. This cable combines three functions into one unit: power source, plus input or output of 0 to 5 VDC signals. Use the input signal for remote valve control; use the output signal for data logging or controlling other instruments. Order the power supply/input/output cable separately at right.

Wetted materials are anodized aluminum, 316 stainless steel, brass, Viton®, and acetal. Maximum pressure drop across the unit is 15 psi at maximum flow. Differential pressure for controllers up to and including 1 sL/min should not exceed 40 psi; 45 psi for models greater than 2 sL/min.

**What's included:** two acetal compression fittings, a 36" (0.9 m) L cable with hub connector, and NIST-traceable calibration report supplied by the manufacturer (digital display models only).



1  
32708-04



1  
32708-26

#### REQUIRED SYSTEM Components

- 1 Flow meter
- 2 Power supply/cable

#### TECHNICAL info!

**Accuracy:** These precalibrated flowmeters operate at inlet pressures between 5 and 40 psi and at gas temperatures between 64 and 77°F (18 to 25°C) while maintaining the stated ±1.5% full scale accuracy and linearity. When operating beyond 5 to 40 psi, add ±0.02%/psi full-scale; if operating beyond 64 to 77°F (18 to 25°C), add ±0.15%/°C full-scale.

#### Specifications

- Max particulate size:** 20 microns
- Accuracy:** ±1.5% full-scale including linearity (see below for details)
- Accuracy coefficient, temperature:** ±0.15%/°C full-scale
- Accuracy coefficient, pressure:** ±0.02%/psi full-scale
- Repeatability:** ±0.5% full-scale
- Response time:** 2 seconds (typical) to within ±2% of actual flow rate from 25 to 100% of full-scale
- Operating ambient:** 50 to 122°F (10 to 50°C)
- Maximum system pressure:** 150 psi (10.3 bar)

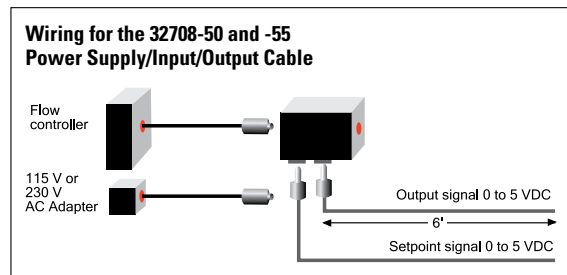
- Leak integrity:** 1 x 10<sup>-4</sup> sccs He (max)
- Transducer input power:** 12.5 to 15 VDC; 250 mA max for controllers
- Output signal:** linear, 0 to 5 VDC (2500 Ω minimum load)
- Connections (included)**  
Models up to 1 sL/min:  
1/8" acetal compression fittings  
Models from 5 and 10 sL/min:  
1/4" acetal compression fittings
- Dimensions (not including fittings)**  
Without display: 3¼"W x 3¾"H x 1"D (8.3 x 9.5 x 2.5 cm)  
With display: 3¼"W x 5¼"H x 1"D (8.3 x 13.3 x 2.5 cm)



#### 2 Power Supply/Input/Output Cable

To power the controller, and to transmit 0 to 5 VDC input and output signals. Comes with everything shown in the diagram below—no extra wires or cables are needed.

- TW-32708-50 Power supply/input/output cable,** 6 ft (1.8 m), 115 VAC
- TW-32708-55 Power supply/input/output cable,** 6 ft (1.8 m), 230 VAC



#### Accessories

- TW-32707-85 Cable** from meter to existing power supply
- TW-32707-80 Extension cable** adds six feet to the length of power supply/input/output cable 32708-50 or -55
- TW-17080-10 NIST-traceable recalibration** with data

Flow rate <sup>†</sup>	1 Without display		1 With 3½-digit LCD			
	Calibrated for air and N <sub>2</sub>		Calibrated for air and N <sub>2</sub>		Calibrated for air, He, and Ar	
	Cat. no.	Price	Cat. no.	Price	Cat. no.	Price
0 to 50 sccm	<a href="#">TW-32708-00</a>		<a href="#">TW-32708-20</a>		<a href="#">TW-32708-32</a>	
0 to 100 sccm	<a href="#">TW-32708-02</a>		<a href="#">TW-32708-22</a>		<a href="#">TW-32708-34</a>	
0 to 500 sccm	<a href="#">TW-32708-04</a>		<a href="#">TW-32708-24</a>		<a href="#">TW-32708-36</a>	
0 to 1 sL/min	<a href="#">TW-32708-06</a>		<a href="#">TW-32708-26</a>		<a href="#">TW-32708-38</a>	
0 to 5 sL/min	<a href="#">TW-32708-08</a>		<a href="#">TW-32708-28</a>		<a href="#">TW-32708-40</a>	
0 to 10 sL/min	<a href="#">TW-32708-10</a>		<a href="#">TW-32708-30</a>		<a href="#">TW-32708-42</a>	

<sup>†</sup>Typical inlet pressure



**Compact Gas Mass Flow Sensors/Transmitters**

**Precisely measure and transmit flow rates**

- Proven design uses metal body components for added durability
- Meter can be calibrated to any of 256 different gases†

These flowmeters feature an advanced straight-tube sensor that ensures accurate and repeatable results. Gas flow measurements are unaffected by moderate temperature and pressure variations at the inlet. The meter also allows a four-point calibration across the flow range to improve meter linearity.

Output data from the meter can be sent via a 0 to 5 VDC or 4 to 20 mA signal; an analog-to-RS converter is also available for data collection and analysis on your PC.

The meter is protected from polarity reversal or short circuit by a built-in resettable fuse. Aluminum models have wetted materials of anodized aluminum, brass, and Viton®; stainless steel (SS) models have wetted materials of SS and Viton.

**What's included:** NIST-traceable calibration report supplied by the manufacturer.

†Contact an Application Specialist to discuss calibration to gases other than air.



**Aluminum gas mass flow transmitter 32658-00**

**TECHNICAL info!**

**Accuracy:** These precalibrated flowmeters operate at inlet pressures between 5 and 40 psi and at gas temperatures between 64 and 77°F (18 to 25°C) while maintaining the stated ±1.5% full scale accuracy and linearity. When operating beyond 5 to 40 psi, add ±0.02%/psi full-scale; if operating beyond 64 to 77°F (18 to 25°C), add ±0.15%/°C full-scale.

**Specifications**



**Max particulate size:** 5 µm

**Accuracy**  
±1.5% full-scale  
(see above for details)

**Accuracy coefficient, temperature:**  
±0.15%/°C full-scale

**Accuracy coefficient, pressure:**  
±0.01%/psi full-scale

**Repeatability:** ±0.5% full scale

**Response time:** 2 seconds (typical) to within ±2% of actual flow rate from 25 to 100% of full-scale

**Operating temperature:**  
32 to 122°F (0 to 50°C)

**Max system pressure:** 1000 psi (69 bar)

**Leak integrity:** 1 x 10<sup>-7</sup> sccs He (max)

**Transducer input power:** 12 VDC, 200 mA max, polarity protected

**Output signal:** linear 0 to 5 VDC (1000 Ω minimum load), 4 to 20 mA (50 to 250 Ω loop resistance)

**Connections (included)**  
Models ≤50 sL/min:  
1/4" compression fittings  
100 sL/min models:  
3/8" compression fittings  
500 sL/min models:  
1/2" compression fittings

**Dimensions (W x H x D),**  
not including fittings  
Models ≤15 sL/min:  
3" x 5" x 1" (7.6 x 12.7 x 2.5 cm)  
20 to 100 sL/min models:  
4" x 6" x 1 1/4" (10.2 x 15.2 x 3.2 cm)  
500 sL/min models:  
12" x 10" x 3 1/2" (30.5 x 25.4 x 8.9 cm)

**Accessories**

**Output Cables** make it easy to connect your flowmeter to other instruments. Three-foot long cables feature DB9(F) connectors.

[TW-32650-60](#) Output cable for 4 to 20 mA signal

[TW-32650-65](#) Output cable for 0 to 5 VDC signal

**Power Supply** allows flowmeters to be powered by AC voltage.

[TW-03277-00](#) Power supply, 110 VAC

[TW-03277-05](#) Power supply, 220 VAC

**Rechargeable Battery Kit** makes your flow transmitters portable. Use transmitters for more than 40 hours without recharging. Batteries can be recharged a minimum of 200 times. Kit contains batteries, charger, output cable, and carrying case with shoulder strap.

[TW-03276-50](#) Rechargeable battery kit, 110 VAC

[TW-03276-55](#) Rechargeable battery kit, 220 VAC

Flow rate	Aluminum bodies		316 stainless steel bodies	
	Catalog number	Price	Catalog number	Price
0 to 10 sccm	<a href="#">TW-32658-00</a>		<a href="#">TW-32658-20</a>	
0 to 20 sccm	<a href="#">TW-32658-01</a>		<a href="#">TW-32658-21</a>	
0 to 50 sccm	<a href="#">TW-32658-02</a>		<a href="#">TW-32658-22</a>	
0 to 100 sccm	<a href="#">TW-32658-03</a>		<a href="#">TW-32658-23</a>	
0 to 200 sccm	<a href="#">TW-32658-04</a>		<a href="#">TW-32658-24</a>	
0 to 500 sccm	<a href="#">TW-32658-05</a>		<a href="#">TW-32658-25</a>	
0 to 1 sL/min	<a href="#">TW-32658-06</a>		<a href="#">TW-32658-26</a>	
0 to 2 sL/min	<a href="#">TW-32658-07</a>		<a href="#">TW-32658-27</a>	
0 to 5 sL/min	<a href="#">TW-32658-08</a>		<a href="#">TW-32658-28</a>	
0 to 10 sL/min	<a href="#">TW-32658-09</a>		<a href="#">TW-32658-29</a>	
0 to 20 sL/min	<a href="#">TW-32658-11</a>		<a href="#">TW-32658-31</a>	
0 to 50 sL/min	<a href="#">TW-32658-14</a>		<a href="#">TW-32658-34</a>	
0 to 100 sL/min	<a href="#">TW-32658-17</a>		<a href="#">TW-32658-37</a>	
0 to 500 sL/min	<a href="#">TW-32658-18</a>		<a href="#">TW-32658-38</a>	

**INNOCAL®**  
INNOVATIVE CALIBRATION SOLUTIONS

**Ensure the accuracy of your flowmeter!**

[TW-17080-00](#) NIST-traceable recalibration for air/gas flowmeter, with test data

[TW-17080-10](#) NIST-traceable recalibration for mass flowmeter, with test data

# Flowmeters

## Thermal Dispersion / Gas Mass

### Compact Gas Mass Flowmeters

#### Precisely measure flow rates and totals

- Proven design uses metal body components for added durability

These flowmeters feature an advanced straight-tube sensor that ensures accurate and repeatable results. Gas flow measurements are unaffected by moderate temperature and pressure variations at the inlet. The meter also allows a four-point calibration across the flow range to improve meter linearity. Output data from the meter can be sent via a 0 to 5 VDC or 4 to 20 mA signal; an analog-to-RS converter is available for data collection and analysis on your PC.

All meters include a detachable 3 1/2-digit LCD that can be tilted up to 90° for easy reading. Remotely mount the display up to three feet using extension cable 32662-70. The optional totalizer 32650-70 displays accumulated flow. The meter is protected from polarity reversal or short circuit by a built-in resettable fuse. Aluminum models have wetted materials of anodized aluminum, brass, and Viton®; stainless steel (SS) models have wetted materials of SS and Viton.

**What's included:** NIST-traceable calibration report supplied by the manufacturer.



Flowmeter 32648-36

#### TECHNICAL info!

**Accuracy:** These precalibrated flowmeters operate at inlet pressures between 5 and 40 psi and at gas temperatures between 64 and 77°F (18 to 25°C) while maintaining the stated ±1.5% full scale accuracy and linearity. When operating beyond 5 to 40 psi, add ±0.02%/psi full-scale; if operating beyond 64 to 77°F (18 to 25°C), add ±0.15%/°C full-scale.

#### Specifications



**Maximum particulate size:** 5 microns

**Accuracy (including linearity):**  
±1.5% full-scale (see below for details)

**Accuracy coefficient, temperature:**  
±0.15%/°C full-scale

**Accuracy coefficient, pressure:**  
±0.01%/psi full-scale

**Repeatability:** ±0.5% full-scale

**Response time:** 2 seconds (typical) to within ±2% of actual flow rate from 25 to 100% of full-scale

**Operating temp:** 32 to 122°F (0 to 50°C)

**Maximum system pressure:** 1000 psi (69 bar)

**Leak integrity:** 1 x 10<sup>-7</sup> sccs He (max)

**Transducer input power:** 12 VDC, 200 mA max; polarity protected

**Output:** linear 0 to 5 VDC (1000 Ω minimum load), 4 to 20 mA (50 to 250 Ω loop resistance)

**Connections (included)**

Models up to 50 sL/min: 1/4" compression fittings  
100 and 200 sL/min models: 3/8" compression fittings  
500 sL/min models: 1/2" compression fittings  
1000 sL/min models: 3/4" NPT(F) fittings

**Dimensions (W x H x D), not including fittings**

Models up to 5 sL/min: 3" x 5 5/8" x 1"  
(7.6 x 14.3 x 2.5 cm)  
Models up to 100 sL/min: 4 1/8" x 6" x 1 1/4"  
(10.5 x 15.2 x 3.2 cm)  
Models up to 200 sL/min: 6 5/8" x 6 5/8" x 1 3/4"  
(16.8 x 16.8 x 4.4 cm)  
Models up to 500 sL/min: 7 1/4" x 7 5/8" x 3"  
(18.4 x 19.4 x 7.6 cm)  
Models up to 1000 sL/min: 7 7/16" x 8 5/8" x 4"  
(18.6 x 21.9 x 10.2 cm)

Flow rate	Pressure drop (max flow)	Aluminum bodies				Price	316 stainless steel bodies				Price
		Air/N <sub>2</sub>	O <sub>2</sub>	H <sub>2</sub>	Ar		Air/N <sub>2</sub>	O <sub>2</sub>	H <sub>2</sub>	Ar	
		Cat. no.	Cat. no.	Cat. no.	Cat. no.		Cat. no.	Cat. no.	Cat. no.	Cat. no.	
0 to 10 sccm	0.04 psi	TW-32648-00	TW-32649-00	TW-32654-00	TW-32657-00		TW-32648-50	TW-32649-50	TW-32654-50	TW-32657-50	
		TW-32648-02	TW-32649-02	TW-32654-02	TW-32657-02		TW-32648-52	TW-32649-52	TW-32654-52	TW-32657-52	
		TW-32648-04	TW-32649-04	TW-32654-04	TW-32657-04		TW-32648-54	TW-32649-54	TW-32654-54	TW-32657-54	
0 to 100 sccm	0.04 psi	TW-32648-06	TW-32649-06	TW-32654-06	TW-32657-06		TW-32648-56	TW-32649-56	TW-32654-56	TW-32657-56	
		TW-32648-08	TW-32649-08	TW-32654-08	TW-32657-08		TW-32648-58	TW-32649-58	TW-32654-58	TW-32657-58	
		TW-32648-10	TW-32649-10	TW-32654-10	TW-32657-10		TW-32648-60	TW-32649-60	TW-32654-60	TW-32657-60	
0 to 1 sL/min	0.04 psi	TW-32648-12	TW-32649-12	TW-32654-12	TW-32657-12		TW-32648-62	TW-32649-62	TW-32654-62	TW-32657-62	
		TW-32648-14	TW-32649-14	TW-32654-14	TW-32657-14		TW-32648-64	TW-32649-64	TW-32654-64	TW-32657-64	
		TW-32648-16	TW-32649-16	TW-32654-16	TW-32657-16		TW-32648-66	TW-32649-66	TW-32654-66	TW-32657-66	
0 to 15 sL/min	0.09 psi	TW-32648-19	TW-32649-19	TW-32654-19	TW-32657-19		TW-32648-68	TW-32649-68	TW-32654-68	TW-32657-68	
	0 to 30 sL/min	1.2 psi	TW-32648-34	TW-32649-34	TW-32654-34		TW-32657-34	TW-32648-84	TW-32649-84	TW-32654-84	
0 to 50 sL/min	3.3 psi	TW-32648-36	TW-32649-36	TW-32654-36	TW-32657-36		TW-32648-86	TW-32649-86	TW-32654-86	TW-32657-86	
	0 to 100 sL/min	8.1 psi	TW-32648-42	TW-32649-42	TW-32654-42		TW-32657-42	TW-32648-92	TW-32649-92	TW-32654-92	
0 to 200 sL/min	4 psi	TW-32648-43	TW-32649-43	TW-32654-43	TW-32657-43		TW-32659-00	TW-32659-02	TW-32659-04	TW-32659-06	
	0 to 500 sL/min	6 psi	TW-32648-44	TW-32649-44	TW-32654-44		TW-32657-44	TW-32659-10	TW-32659-12	TW-32659-14	
0 to 1000 sL/min	10 psi	TW-32648-45	TW-32649-45	TW-32654-45	TW-32657-45		TW-32659-20	TW-32659-22	TW-32659-24	TW-32659-26	

#### TW-17080-10 NIST-traceable recalibration

**Output Cables** make it easy to connect your flowmeter to other instruments. Features DB9(F) connectors.

**TW-32650-60 Output cable,** for 4 to 20 mA signal, 1-mL

**TW-32650-65 Output cable,** for 0 to 5 VDC signal, 1-mL

**Extension Cable** lets you extend display up to three feet away for remote reading.

**TW-32662-70 Extension cable**

**Power Supply** allows flowmeters to be powered by AC voltage.

**TW-03277-00 Power supply,** 110 VAC

**TW-03277-05 Power supply,** 220 VAC

**Flow Totalizer 32650-22** displays instantaneous, total, and accumulated flow rates, has 47 different volumetric and mass flow units, and digital interface.

**TW-32650-22 Flowmeter totalizer**

#### MORE online!

For more information of the Flow Totalizer, go to . . .

[ColeParmer.com](http://ColeParmer.com)



**Compact Gas Mass Flow Controllers**

**Precisely control flow rates with built-in valve**

■ Proven design uses metal body components for added durability  
These controllers feature an advanced straight-tube sensor that ensures accurate and repeatable results. Gas flow measurements are unaffected by moderate temperature and pressure variations at the inlet. The meter also allows a four-point calibration across the flow range to improve meter linearity.

The flow rate set point can be established by either a local potentiometer or by a remote 4 to 20 mA or 0 to 5 VDC signal. Output data is sent via a 0 to 5 VDC or 4 to 20 mA signal; an analog-to-RS converter is also available for data collection and analysis on your PC.

All controllers include a detachable 3½-digit LCD that can be tilted up to 90° for easy reading. The display is remote mountable to three feet using extension cable 32662-70.

The controller is protected from polarity reversal or short circuit by a built-in resettable fuse. Aluminum models have wetted materials of anodized aluminum, brass, and Viton®; stainless steel (SS) models have wetted materials of SS and Viton.

**What's included:** NIST-traceable calibration report supplied by the manufacturer.



Adjust flow rate locally with the built-in set point potentiometer.

Controller 32661-22

**TECHNICAL info!**

**Accuracy:** These precalibrated flowmeters operate at inlet pressures between 5 and 40 psi and at gas temperatures between 64 and 77°F (18 to 25°C) while maintaining the stated ±1.5% full scale accuracy and linearity. When operating beyond 5 to 40 psi, add ±0.02%/psi full-scale; if operating beyond 64 to 77°F (18 to 25°C), add ±0.15%/°C full-scale.

**Specifications**

**Maximum particulate size:** 5 microns

**Accuracy** (including linearity)  
±1.5% full-scale (see above for details)

**Accuracy coefficient, temperature:**  
±0.15%/°C full-scale

**Accuracy coefficient, pressure:**  
±0.01%/psi full-scale

**Repeatability:** ±0.5% full-scale

**Response time:** 2 seconds (typical) to within ±2% of actual flow rate from 25 to 100% of full-scale

**Operating temperature:**  
32 to 122°F (0 to 50°C)

**Maximum system pressure:** 1000 psi (69 bar)

**Leak integrity:** 1 x 10<sup>-7</sup> sccs He (max)

**Transducer input power:** 12 VDC, 1100 mA max; polarity protected

**Output signal:** linear 0 to 5 VDC (1000 Ω minimum load), 4 to 20 mA (50 to 500 Ω loop resistance)

**Connections** (included)

Models up to 50 sL/min: ¼" compression fittings  
200 sL/min models: ⅜" compression fittings  
500 sL/min models: ½" compression fittings  
1000 sL/min models: ¾" NPT(f) fittings

**Dimensions (W x H x D)**, not including fittings

Models up to 5 sL/min: 4¾" x 5⅝" x 1" (12.1 x 14.3 x 2.5 cm)

15 to 100 sL/min models:  
5¼" x 6" x 1¼" (13.3 x 15.2 x 3.2 cm)



Flow rate	Pressure drop (max flow)	Aluminum bodies				Price	316 stainless steel bodies				Price
		Air/N <sub>2</sub>	O <sub>2</sub>	H <sub>2</sub>	Ar		Air/N <sub>2</sub>	O <sub>2</sub>	H <sub>2</sub>	Ar	
0 to 10 sccm	1.06 psi	TW-32660-00	TW-32660-26	TW-32660-52	TW-32660-78		TW-32661-00	TW-32661-26	TW-32661-52	TW-32661-78	
0 to 20 sccm		TW-32660-02	TW-32660-28	TW-32660-54	TW-32660-80		TW-32661-02	TW-32661-28	TW-32661-54	TW-32661-80	
0 to 50 sccm		TW-32660-04	TW-32660-30	TW-32660-56	TW-32660-82		TW-32661-04	TW-32661-30	TW-32661-56	TW-32661-82	
0 to 100 sccm	1.06 psi	TW-32660-06	TW-32660-32	TW-32660-58	TW-32660-84		TW-32661-06	TW-32661-32	TW-32661-58	TW-32661-84	
0 to 200 sccm		TW-32660-08	TW-32660-34	TW-32660-60	TW-32660-86		TW-32661-08	TW-32661-34	TW-32661-60	TW-32661-86	
0 to 500 sccm		TW-32660-10	TW-32660-36	TW-32660-62	TW-32660-88		TW-32661-10	TW-32661-36	TW-32661-62	TW-32661-88	
0 to 1 sL/min	1.06 psi	TW-32660-12	TW-32660-38	TW-32660-64	TW-32660-90		TW-32661-12	TW-32661-38	TW-32661-64	TW-32661-90	
0 to 2 sL/min		TW-32660-14	TW-32660-40	TW-32660-66	TW-32660-92		TW-32661-14	TW-32661-40	TW-32661-66	TW-32661-92	
0 to 5 sL/min		TW-32660-16	TW-32660-42	TW-32660-68	TW-32660-94		TW-32661-16	TW-32661-42	TW-32661-68	TW-32661-94	
0 to 15 sL/min	3.87 psi	TW-32660-19	TW-32660-45	TW-32660-71	TW-32660-95		TW-32661-19	TW-32661-45	TW-32661-71	TW-32661-95	
0 to 30 sL/min	3.50 psi	TW-32660-20	TW-32660-46	TW-32660-72	TW-32660-97		TW-32661-20	TW-32661-46	TW-32661-72	TW-32661-97	
0 to 50 sL/min	11 psi	TW-32660-22	TW-32660-48	TW-32660-74	TW-32660-98		TW-32661-22	—	—	—	
0 to 100 sL/min	20 psi	TW-32660-24	TW-32660-50	TW-32660-76	TW-32660-99		TW-32661-24	—	—	—	
0 to 500 sL/min	47 psi	TW-32665-00	—	—	—		TW-32666-00	—	—	—	
0 to 1000 sL/min		TW-32665-10	—	—	—	—	TW-32666-10	—	—	—	

**TW-17080-10** NIST-traceable recalibration with data

**TW-32662-65** Cable, 8-ft (2.4 m) L for connecting flowmeters/controllers to any instrument that accepts analog input signals. DB15(F) connector with bare wire ends

**TW-32662-70** Extension cable, for remote placement of display up to three feet away

**Power Supplies** for operation by AC voltage.

**TW-32662-50** Power supply; US plug, 110 VAC

**TW-32662-55** Power supply; Euro plug, 220 VAC

**TW-32662-60** Power supply; U.K. plug, 240 VAC

**Flow Totalizer 32650-22** displays instantaneous, total, and accumulated flow rates, has 47 different volumetric and mass flow units, and digital interface.

**TW-32650-22** Flowmeter totalizer

**MORE online!**

For more information on the Flow Totalizer, go to . . .

[ColeParmer.com](http://ColeParmer.com)



# Flowmeters

## Thermal Dispersion / Gas Mass

### Universal Mass Flow Control Systems

#### Use up to four mass flow controllers

- Configure and direct the operation of up to four controllers either locally, via an RS-232 interface, or via the internet
- Use the integrated batch, totalizer, or timer functions with up to eight relays to control external system devices or alarms
- Controllers feature exceptional repeatability that reduces quality deviations in any process that relies on multiple devices

#### REQUIRED SYSTEM Components

- 1 Mass Flow Command Module
- 2 Mass Flow Controller



1

**Microprocessor command module 32681-25 accepts up to four controllers and communicates via Ethernet.**

#### 1 Mass Flow Command Modules

Models feature full menu-driven software for programming parameters. Without the use of an additional programmer module or external software, four buttons on the unit's face can be used to program and control all functions.

A primary benefit of this design is the flexibility with which the process control parameters can be set and monitored. The backlit LCD readout shows flows/totals in any of 13 different mass or volume flow units; up to four controller flow rates are shown in a single view. The local display is capable of displaying flow rate, set point, valve and alarm status along with totalizer data.

For basic process monitoring or control, each controller channel has two normally open (NO) or normally closed (NC) relays available. Program totalizer to activate alarms or actuate devices based on preset volumes. For more advanced control, several programmable functions are included within the module's software—a batch program allows you to execute a custom program of up to 16 steps and a timer program can direct flow control through a user-defined series of up to 96 steps.

Select from models with RS-232 interface or ethernet interface. In addition to the comprehensive local display, an RS-232 port allows for the download of data to a computer for analysis.



Number of controller inputs	RS-232 interface		Ethernet interface	
	Catalog number	Price	Catalog number	Price
4	<a href="#">TW-32681-22</a>		<a href="#">TW-32681-25</a>	

#### 2 Mass Flow Controllers

The meter allows for a four-point calibration across the flow range to improve meter linearity. One key benefit of this design is its strong repeatability characteristics, making it ideal for use in applications where the variability of multiple controllers can affect the quality of a process. Controller is easily connected to the command module using an 8-ft long flat cable with integrated multipin D-sub connector (included). To protect from wiring errors, each controller is protected from shorting or polarity reversal by a resettable fuse. Wetted parts for the controller are 316 SS and Viton® O-rings.

**What's included:** an NIST-traceable calibration report supplied by the manufacturer is included for each controller unit.



2

**Mass flow controller 32668-16**

#### Specifications

- Max particulate size:** 100 microns
- Accuracy:** ±1% full-scale including linearity
- Accuracy coefficient, temperature:** ±0.1%/°C full-scale
- Accuracy coefficient, pressure:** ±0.01%/psi full-scale
- Repeatability:** ±0.2% full-scale

- Response time:** 2 seconds (typical) to within ±2% of actual flow rate from 25 to 100% of full-scale
- Operating temp:** 41 to 122°F (5 to 50°C)
- Maximum system pressure:** 500 psi (34.4 bar)
- Optimum differential pressure:** 25 psi (1.7 bar)
- Maximum differential pressure:** 40 psi (2.6 bar)
- Leak integrity:** 1 x 10<sup>-9</sup> sccs He maximum

- Output signal:** 0 to 5 VDC (2000 Ω minimum load)
- Connections:** ¼" compression fittings
- Display type:** 24" x 2" LCD dot matrix with backlight
- Dimensions (W x H x D)**  
 10 sccm to 5 sL/min models: 5½" x 5¾" x 1½"  
 (14.0 x 14.6 x 3.8 cm)  
 15 to 30 sL/min models: 6½" x 6" x 1¾"  
 (16.5 x 15.2 x 4.8 cm)



Flow rate	Pressure drop (max flow)	Air/N <sub>2</sub> /CO	O <sub>2</sub>	H <sub>2</sub>	He	CO <sub>2</sub>	Price
		Catalog number	Catalog number	Catalog number	Catalog number	Catalog number	
0 to 10 sccm	1.0 psi	<a href="#">TW-32668-00</a>	—	—	—	—	
0 to 100 sccm		<a href="#">TW-32668-06</a>	—	—	—	—	
0 to 200 sccm		<a href="#">TW-32668-08</a>	—	—	—	—	
0 to 500 sccm	1.1 psi	—	—	—	<a href="#">TW-32677-10</a>	<a href="#">TW-32678-10</a>	
0 to 1 sL/min		<a href="#">TW-32668-12</a>	<a href="#">TW-32669-12</a>	<a href="#">TW-32676-12</a>	<a href="#">TW-32677-12</a>	<a href="#">TW-32678-12</a>	
0 to 5 sL/min	2.2 psi	—	—	<a href="#">TW-32676-16</a>	—	—	
0 to 15 sL/min		<a href="#">TW-32668-20</a>	—	—	—	—	





## Porter Gas Mass Flow Controllers

### Fast response and high accuracy in a 1/16 DIN unit

- Pluggable terminal block electrical connections
- Remote analog I/O capability

MPC series mass flow controllers represent a unique concept in cost-efficient mass flow control. The front panel features easy-to-use functions and a large digital display for reading set point, flow rate, and total flow. Alarms, batch control, totalizer, and multiple set points are programmable for enhanced versatility. Flow controllers have remote analog input and output capability.

The MicroFlow silicon micro-machined sensor is manufactured utilizing MEMS and thin film technologies. This results in an extremely fast, accurate and reliable thermal mass flow sensor that is unaffected by pressure and temperature fluctuations.

Program up to four set points via front panel or external input. Air, nitrogen, argon, and carbon dioxide measurement are standard.

**What's included:** panel-mounting bracket and mating electrical connector.



68025-24

### Specifications

**Media:** nitrogen/air, argon, and carbon dioxide.  
Gas must be dry, clean and oil-free  
**Accuracy:** ±2% full-scale (at 20°C and 30 psi)  
**Repeatability:** ±1% full-scale  
**Operating temperature:** 14 to 122°F (-10 to 50°C)  
**Max operating pressure:** 75 psi (5.2 bar)  
**Max differential pressure:** 40 psid

**Inputs:** two potential-free contact or open collector  
**Output signal:** user-selectable 0 to 5 or 1 to 5 VDC  
**Wetted materials:** brass (nickel-plated), stainless steel, PTFE, Viton®  
**Process connections:** 1/8" NPT(F)  
**Display:** 7-segment LED  
**Power:** 24 VDC

Catalog number	Flow range (L/min)				Price
	Air	N <sub>2</sub>	Ar	CO <sub>2</sub>	
<a href="#">TW-68025-24</a>	0.02 to 0.5	0.02 to 0.5	0.02 to 0.5	0.012 to 0.3	
<a href="#">TW-68025-26</a>	0.08 to 2	0.08 to 2	0.08 to 2	0.04 to 1.2	
<a href="#">TW-68025-28</a>	0.1 to 5	0.1 to 5	0.1 to 5	0.06 to 3	
<a href="#">TW-68025-30</a>	0.4 to 20	0.4 to 20	0.4 to 20	0.3 to 16	

## Thermal Noninvasive Ultra Low-Flow Flowmeters

### Nano-and micro-flow measurements for precision laboratory applications

- Resolutions down to 500 pL/min

These liquid mass flowmeters enable extremely fast and accurate measurements of ultra-low liquid mass flows, and operate with total media isolation, very little dead volume, and no moving parts. CMOSens® sensor technology combines a high-precision thermal sensor element with digital signal processing on one single CMOS chip. In addition, the digital intelligence of the CMOSens sensor technology enables digital interfaces that permit an easy link with PCs, PLC, and other controllers.

All measurement data is fully calibrated and temperature compensated by means of an internal microcontroller. Excellent chemical resistance and bio-compatibility are ensured, and the process medium only gets in contact with the straight sensor capillary. The process medium only gets into contact with the straight sensor capillary, the PEEK fittings, and (for models 32611-06 to -10) PTFE as a sealing material.

**Models 32611-00 to -08** are calibrated for water only. Superior repeatability of the measurement signal is still maintained for other media and thus allows after-measurement-correction on a computer or microcontroller. **Model 32611-10** is calibrated for IPA only but can also be used for repeatable measurements of other hydrocarbons such as ethanol, acetone, diesel, petroleum, ether, and most other media; however it does not work with aqueous solutions.

**What's included:** Models 32611-00 to -04: PC software, 2 µm in-line filters (model -00 only), OD360 PEEK® capillaries, RS-232 data cable, and AC adapter for 110 to 230 VDC. Models 32611-06 and -08: PC software, UNF 10-32 fitting, barb and luer connectors, RS-232 data cable, and AC adapter for 110 to 230 VDC. Model 32611-10: pigtail cable, fittings for 1/8" OD plastic tubing, and barb and luer connectors.



32611-00

32611-06

32611-10

### Specifications

#### Accuracy at ≥calibrated min flow

Models 32611-00 to -04: 10% of measured value  
Models 32611-06 to -08: 3% of measured value  
Model 32611-10: 10% of measured value

#### Operating temperature

Models 32611-00 to -04: 50 to 113°F (10 to 45°C)  
Models 32611-06 to -08: 32 to 140°F (0 to 60°C)  
Model 32611-10: 50 to 104°F (10 to 40°C)

**Fittings:** PEEK



Catalog number	Calibrated flow range	Resolution	Max pressure drop	Internal sensor capillary	Process connection	Power supply	Electrical connection	Output	Price
<a href="#">TW-32611-00</a>	50 to 1500 nL/min	0.5 nL/min	22 psi (1.5 bar)	Fused silica	Micro fitting for 360 µm capillaries	7 to 18 VDC	4-pin M8	RS-232	
<a href="#">TW-32611-02</a>	250 to 7000 nL/min	1.5 nL/min	0.7 psi (0.05 bar)						
<a href="#">TW-32611-04</a>	1 to 40 µL/min	7 nL/min	0.3 psi (0.02 bar)						
<a href="#">TW-32611-06</a>	40 to 1000 µL/min	1.5 µL/min at max flow	<0.01 psi (1 mbar)	Borosilicate glass	UNF 10-32	7 to 18 VDC	4-pin M8	RS-232	
<a href="#">TW-32611-08</a>	200 to 4000 µL/min	5 µL/min at max flow	<0.01 psi (1 mbar)						
<a href="#">TW-32611-10</a>	0 to 80 mL/min	—	0.6 psi (40 mbar)	Borosilicate glass	1/4-28	16 to 26 VDC	8-pin M8	0 to 10 VDC	



# Flowmeters

## Gas Mass

### Digital Gas Mass Flowmeters

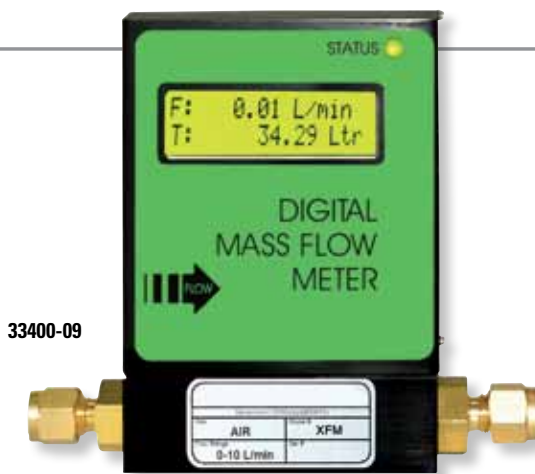
#### Store calibration data for up to 10 gases

- Self-diagnostic tests
- Automatic sensor zero offset adjustment

Meters incorporate a precision microcontroller and nonvolatile memory that stores all hardware specific variables, up to 10 different calibration tables, conversion factors for up to 32 gases, and supports up to 23 volumetric flow or mass flow engineering units, including user-defined units. This feature allows the same meter to be calibrated for multiple gases while maintaining the rated accuracy on each. In addition, provision is made for a user-defined conversion factor. Conversion factors may be applied to any of the ten gas calibrations via digital interface commands. Program flowmeters remotely via RS-485 or RS-232. Each unit comes with a 15-pin D-connector with a stripped 6-ft, 3-wire computer communications cable and a 3-ft, 2-wire cable for connection to a power supply. Additional cables as well as power supplies for the flowmeters are available below.

Flowmeters support various functions including programmable flow totalizer, high and low flow alarm, automatic zero adjustment, two relay outputs, jumper selectable 0 to 5 VDC or 4 to 20 mA analog outputs, status LED diagnostic, and internal or user-specific K-factors. LCD display with adjustable back light provides flow, total, and diagnostic reading simultaneously. The digital RS-485 and RS-232 interfaces provides access to applicable internal data including flow, CPU temperature, auto zero, totalizer and alarms settings, gas table, conversion factors and engineering units selection, dynamic response compensation and linearization table adjustment. The analog interface provides 0 to 5 VDC or 4 to 20 mA outputs for flow reading. The auto zero feature necessitates a condition of absolutely no flow through the meter during the adjustment process. Provisions are made to either start, read, or save the current auto zero value via digital commands.

The total volume of the gas is calculated by integrating the actual gas flow rate as a function of time. Program high and low gas flow alarm limits via digital interface. Alarm action can be



33400-09

assigned with preset delay interval (0 to 3600 seconds) to activate the contact closure (separate for high and low alarm). Latch mode control feature allows each relay to be latched on or follow the corresponding alarm status.

Lower-cost units are also available without LCD for OEM applications in cooling systems, semiconductor manufacturing, or gas chromatography applications. Meters with Profibus industrial communication capabilities are also available. Contact our Application Specialists for additional information regarding these options.

**Note:** These mass flowmeters are designed to work only with clean gases; never try to measure flow rates of liquids with these meters.

**What's included:** power and communication cable and NIST-traceable calibration report supplied by the manufacturer.

### Specifications

**Accuracy (including linearity):** ±1% of full-scale at standard temperature and pressure

**Accuracy coefficient, temperature:** ±0.15% of full-scale/°C or better

**Accuracy coefficient, pressure:** ±0.01% full-scale/psi or better

**Repeatability:** ±0.25% of full-scale

**Max pressure drop:** 0.18 psid

**Response time:** 2 seconds (typical) to within ±2% of actual flow rate from 25 to 100% of full-scale

**Operating temp:** 41 to 122°F (5 to 50°C)

**Max system pressure:** 500 psig (34.5 bar)

**Leak integrity:** 1 x 10<sup>-9</sup> mL/sec HE

**Power:** 11 to 26 VDC

**Output:** 0 to 20 mA, 0 to 5 VDC, and RS-485

**Process connections:** ¼" compression

**Dimensions (W x H x D),** not including fittings:  
3½" x 4½" x 1" (7.9 x 11.4 x 2.5 cm)



Flow rate	Aluminum bodies						Price
	Air/N <sub>2</sub> /CO	O <sub>2</sub>	H <sub>2</sub>	Ar	He	CO <sub>2</sub>	
	Cat. no.	Cat. no.	Cat. no.	Cat. no.	Cat. no.	Cat. no.	
0 to 5 sccm	TW-33400-00	TW-33400-10	TW-33400-20	TW-33400-30	TW-33400-40	TW-33400-50	
0 to 10 sccm	TW-33400-01	TW-33400-11	TW-33400-21	TW-33400-31	TW-33400-41	TW-33400-51	
0 to 20 sccm	TW-33400-02	TW-33400-12	TW-33400-22	TW-33400-32	TW-33400-42	TW-33400-52	
0 to 50 sccm	TW-33400-03	TW-33400-13	TW-33400-23	TW-33400-33	TW-33400-43	TW-33400-53	
0 to 100 sccm	TW-33400-04	TW-33400-14	TW-33400-24	TW-33400-34	TW-33400-44	TW-33400-54	
0 to 200 sccm	TW-33400-05	TW-33400-15	TW-33400-25	TW-33400-35	TW-33400-45	TW-33400-55	
0 to 500 sccm	TW-33400-06	TW-33400-16	TW-33400-26	TW-33400-36	TW-33400-46	TW-33400-56	
0 to 1 LPM	TW-33400-07	TW-33400-17	TW-33400-27	TW-33400-37	TW-33400-47	TW-33400-57	
0 to 5 LPM	TW-33400-08	TW-33400-18	TW-33400-28	TW-33400-38	TW-33400-48	TW-33400-58	
0 to 10 LPM	TW-33400-09	TW-33400-19	TW-33400-29	TW-33400-39	TW-33400-49	—	

Flow rate	316 stainless steel bodies						Price
	Air/N <sub>2</sub> /CO	O <sub>2</sub>	H <sub>2</sub>	Ar	He	CO <sub>2</sub>	
	Cat. no.	Cat. no.	Cat. no.	Cat. no.	Cat. no.	Cat. no.	
0 to 5 sccm	TW-33401-00	TW-33401-10	TW-33401-20	TW-33401-30	TW-33401-40	TW-33401-50	
0 to 10 sccm	TW-33401-01	TW-33401-11	TW-33401-21	TW-33401-31	TW-33401-41	TW-33401-51	
0 to 20 sccm	TW-33401-02	TW-33401-12	TW-33401-22	TW-33401-32	TW-33401-42	TW-33401-52	
0 to 50 sccm	TW-33401-03	TW-33401-13	TW-33401-23	TW-33401-33	TW-33401-43	TW-33401-53	
0 to 100 sccm	TW-33401-04	TW-33401-14	TW-33401-24	TW-33401-34	TW-33401-44	TW-33401-54	
0 to 200 sccm	TW-33401-05	TW-33401-15	TW-33401-25	TW-33401-35	TW-33401-45	TW-33401-55	
0 to 500 sccm	TW-33401-06	TW-33401-16	TW-33401-26	TW-33401-36	TW-33401-46	TW-33401-56	
0 to 1 LPM	TW-33401-07	TW-33401-17	TW-33401-27	TW-33401-37	TW-33401-47	TW-33401-57	
0 to 5 LPM	TW-33401-08	TW-33401-18	TW-33401-28	TW-33401-38	TW-33401-48	TW-33401-58	
0 to 10 LPM	TW-33401-09	TW-33401-19	TW-33401-29	TW-33401-39	TW-33401-49	—	

### Accessories

**TW-33401-90 Power and communication cable;** 15-pin D-connector with a stripped 6-ft (1.8-m), 3-wire connector with communications cable and a 3-ft (0.9-m), 2-wire cable for connecting to a power supply

**TW-17080-10 NIST-traceable calibration** with data

**TW-33401-91 Power supply with communication cable;** 115 V to 15-pin D-connector

**TW-33401-92 Power and communication cable;** 115 V to 15-pin D-connector with additional 9-wire analog output

## FreeFlow™ Differential Pressure Flowmeters for Water

### Install in any orientation—horizontal, vertical, or inverted

- Accurate and economical

Use these minimally invasive, segmented wedges flow sensors to monitor and control process water. Flowmeters have no moving parts. The segmented wedge element provides a simple and reliable restriction for sensing flow as related to pressure differential. Several ranges of calibration accommodate the requirements typical to process water applications. Units measure less than 10" (25.4 cm) long and 3½" (8.9 cm) wide, with a flanged mounting base for simple installation.

### Specifications



**Accuracy:** ±1% full-scale  
**Repeatability:** ±0.5% full-scale  
**Response time:** <500 mS  
**Max operating temperature:** 170°F (76°C)  
**Max pressure:** 125 psi (8.6 bar)  
**Output:** 4 to 20 mA

**Wetted parts**  
 End port and wedge element: PVC  
 Pressure sensor: polyetherimide  
 Electrical enclosure: polycarbonate  
**Input power:** 12 to 35 VDC  
**Electrical connection:** 4-pin DIN 43-650  
**Electrical protection:** short circuit, transient, and reverse polarity



32852-52

Catalog number	Flow rate GPM (LPM)	Process connection	Price
<a href="#">TW-32852-52</a>	0.6 to 5 (2.3 to 18.9)	¾" NPT(F)	
<a href="#">TW-32852-54</a>	1 to 10 (4.9 to 37.9)	½" NPT(F)	
<a href="#">TW-32852-56</a>	1 to 15 (6.8 to 56.8)	¾" NPT(F)	

[TW-17080-12](#) NIST-traceable recalibration with data

## Cole-Parmer® Ultralow Differential Pressure Flowmeter for Liquids

### Provides readings with seven units of measure

This compact and fully contained unit provides flow measurements via differential pressure in ranges from 0 to 25 mL/min. The simple four-button control panel allows you to show flow/total, units of measure, zero, and power the unit on or off. Easy-to-read 7-digit LCD displays the current and total accumulated flow. Accuracy is ±2% full-scale for liquids with temperatures of 68 to 86°F (20 to 30°C). Below and above these temperature ranges, the accuracy is ±4% full-scale, and unit may be used with fluid temperatures from 32 to 122°F (0 to 50°C). You can adjust a viscosity compensation correction for more accurate measurement. Unit is constructed with chemical-resistant ABS plastic.

**What's included:** chemical-resistant nylon ¼" barb fittings, AC power adapter, 9 V battery connector for portable use, and an NIST-traceable calibration report supplied by the manufacturer.

**NEW**



32910-60

### Specifications



Unit of measure	Range
Milliliters/minute	4 to 25
Liters/minute	0.004 to 0.025
Cubic centimeters/minute	4 to 25
Fluid ounces/minute	0.135 to 0.84
Gallons/minute	0.001050 to 0.00660
Fluid imperial ounces/minute	0.140 to 0.88
Imperial gallons/minute	0.00088 to 0.00549

Catalog number	Description	Flow range	Price
<a href="#">TW-32910-60</a>	Differential pressure flow meter	4 to 25 mL/min	

[TW-17080-12](#) NIST-traceable recalibration with data



# Flowmeters Differential Pressure

## Cole-Parmer® Flowmeters and Controllers for Water

### Achieve accurate, ultrafast volumetric measurement and control

- Technology allows for installation without typical inlet/outlet straight-run requirements
- Units provide data on multiple fluid parameters: flow, pressure and temperature
- All functions are user-programmable through an integrated keypad

These meters measure flow via pressure drop across a laminar flow element (LFE). Because the flow element makes the flow stream laminar, placement in the process does not require straight pipe runs upstream or downstream of the meter, greatly simplifying installation. The LFEs also provide an outstanding turndown ratio of 50:1 giving the meter a very broad and accurate measuring range. The design provides an ultrafast response at start-up or input change—often within 100 milliseconds. The 0 to 5 VDC output allows transmission of the flow value to a remote display, recorder, or controller regulating a valve or pump.

For the flow controllers, an integrated PID controller directs the unit's response to process changes. Set the P and D parameters to tailor the unit's response. Flow setpoint is established with the optional set point control module, a 0 to 5 V signal, or an RS-232 input signal. For portable flow metering (not controlling) applications, order the battery pack listed below. Units can be mounted via threaded taps in the meter body.

Meters and controllers feature dynamic display that simultaneously shows flow rate, line pressure, fluid temperature, and (for controllers) the set point. For the units shown, both power and input/output signals are transmitted through a single multi-pin connector.

**What's included:** integrated sensor, display, and transmitter; controllers add the valve assembly. All models include a 120 VAC power adapter; 220 VAC European adapters may be ordered separately below. Also included: NIST-traceable calibration report supplied by the manufacturer.



Flow controller  
32907-45

Flowmeter  
32908-40

### TECHNICAL info!

This technology relies on fluid viscosity to determine flowrate. Using these devices with pure water is the ideal application.

For additional information about this technology, please refer to our Introduction on pages 589-592.



### Specifications

**Max particulate size:**

Up to 50 mL/min: 20 µm  
100 mL/min to 10 LPM: 50 µm

**Accuracy:** ±2% full-scale

**Repeatability:** ±2% of full-scale

**Response time**

Flowmeters: 20 msec  
Flow controllers: 100 msec

**Turndown ratio:** 50:1

**Operating temp:** 50 to 122°F (10 to 50°C)

**Max system pressure:** 100 psig (6.9 bar)

**Pressure drop:** 0.8 psig (flowmeter element)

**Wetted materials**

Flowmeters: 303 SS (stainless steel), Viton®, silicone RTV, polyetherimide  
Flow controllers: 302 SS, 303 SS, Viton, silicone RTV, polyetherimide, and brass

**Input power**

Flowmeters: 7 to 30 VDC, 30 mA  
Flow controllers: 12 to 30 VDC, 250 mA

**Electrical connection:** 8-pin circular mini DIN

**Display type:** four-digit, seven-line LCD; 1/4" H flow display

**Output signal:** 0 to 5 VDC, 0 to 10 VDC RS-232

**Input signal:** 0 to 5 VDC, 0 to 10 VDC RS-232 (controllers only)

**Connections**

1 mL/min: 10-32 UNF  
5 mL/min to 10 LPM: 1/8" NPT(F)

Flowmeters/controllers†	Dimensions
Models up to 500 mL/min	2 <sup>9</sup> / <sub>8</sub> " L x 4 <sup>5</sup> / <sub>8</sub> " H x 1 <sup>1</sup> / <sub>8</sub> " D (6.0 x 11.7 x 2.9 cm)
Models 1 LPM to 10 LPM	2 <sup>9</sup> / <sub>8</sub> " L x 4 <sup>3</sup> / <sub>4</sub> " H x 1 <sup>1</sup> / <sub>8</sub> " D (6.7 x 12.1 x 2.9 cm)

†Dimensions do not include control valve

Flow rate	Flowmeters		Flow controllers	
	Catalog number	Price	Catalog number	Price
0 to 1 mL/min	<a href="#">TW-32908-40</a>	—	—	—
0 to 5 mL/min	<a href="#">TW-32908-41</a>	—	—	—
0 to 10 mL/min	<a href="#">TW-32908-42</a>	—	—	—
0 to 50 mL/min	<a href="#">TW-32908-43</a>	—	<a href="#">TW-32907-43</a>	—
0 to 100 mL/min	<a href="#">TW-32908-44</a>	—	<a href="#">TW-32907-44</a>	—
0 to 200 mL/min	<a href="#">TW-32908-45</a>	—	<a href="#">TW-32907-45</a>	—
0 to 500 mL/min	<a href="#">TW-32908-46</a>	—	<a href="#">TW-32907-46</a>	—
0 to 1 LPM	<a href="#">TW-32908-47</a>	—	—	—
0 to 5 LPM	<a href="#">TW-32908-48</a>	—	—	—
0 to 10 LPM	<a href="#">TW-32908-49</a>	—	—	—

### Accessories

**TW-32916-57 Power adapter**, 220 VAC, for all flowmeters or controllers 10 LPM or less, Euro plug included

**TW-32916-58 Power adapter**, 220 VAC, for controllers 50 LPM and greater, Euro plug included

**TW-32929-50 Battery pack**, for portable flow/mass measurement

**TW-32929-89 Connection cable**, 8-DIN to stripped ends

**TW-17080-12 NIST-traceable recalibration** with data



## Modular Liquid Flow Rate Sensor Systems

### System design is flexible to suit a wide range of applications

- Brass sensors for high pressure; PTFE sensors for high-purity systems; Ryton® PPS sensors for aggressive and non-aggressive liquids
- Interface with data acquisition systems
- Dual signal outputs to monitor and record flow rates and totals

Use these modular flow sensors and totalizers for any type of process or laboratory application. The flow sensors measure low viscosity liquids from 13 mL/min up to 10 L/min. For a complete system, order a flow sensor, power supply, and flow display/totalizer.

### REQUIRED SYSTEM Components

- 1 Flow sensor
- 2 Power supply/adaptor
- 3 Flow display/totalizer for local indication



1 Brass sensor 32704-14



1 PTFE sensor 32705-00

### 1 Flow Sensors

These sensors use an optical beam, turbine wheel, and photodiode translator to generate a 7.5 V pulse output that is proportional to the flow rate. Sensors also provide a highly linear 0 to 5 VDC output signal for control or data logging purposes.

**Note:** Due to the optical pick-up, the sensors should not be used with opaque liquids.

Ryton® PPS sensors have wetted materials of polyphenylene sulfide (PPS), glass, sapphire, and Viton®. Brass sensors have wetted materials of brass, glass, and Viton. PTFE sensors have wetted materials of PTFE, sapphire, and Kalrez.

A separate power supply is required for these flow sensors—order separately below. If a Ryton® PPS or brass sensor is being used with an existing power supply, order cable assembly 32704-52 at right (PTFE models already include their own cable assembly).

### Specifications for Sensors

**Fluid type:** low viscosity (less than 10 cSt), clear to lightly colored liquids

**Max particulate size:** 10 microns

**Accuracy:** ±3% full-scale

**Linearity:** ±3% full-scale

**Repeatability:** ±0.2% full-scale

**Max operating temp:** 131°F (55°C)

**Max pressure:** Ryton PPS models: 100 psi (6.9 bar),  
Brass models: 500 psi (34.5 bar)  
PTFE models: 60 psi (4.1 bar)

**Output signal:** 0 to 5 VDC analog and square wave pulse

**Input power:** Ryton PPS and brass models: 12.5 ±2 VDC, 30 mA, PTFE models: regulated 12 VDC, 15 mA

**Dimensions (L x W x H):** Ryton PPS and brass models: 2 3/8" x 1 5/8" x 1 1/2" (6.0 x 4.1 x 3.8 cm)  
PTFE models: 2 1/4" x 2 1/4" x 1 3/4" (5.7 x 5.7 x 4.4 cm)



Flow rate	Connections (tubing OD)	Ryton® PPS sensors <sup>†</sup>		Brass sensors		PTFE sensors <sup>‡</sup>	
		Cat. no.	Price	Cat. no.	Price	Cat. no.	Price
13 to 100 mL/min	1/8"	TW-32704-00		TW-32704-12		TW-32705-00	
50 to 500 mL/min	1/4"	TW-32704-02		TW-32704-14		TW-32705-02	
100 to 1000 mL/min	1/2"	TW-32704-04		TW-32704-16		TW-32705-04	
0.2 to 2 L/min	1/4"	TW-32704-06		TW-32704-18		TW-32705-06	
0.5 to 5 L/min	3/8"	TW-32704-08		TW-32704-20		TW-32705-08	
1 to 10 L/min	3/8"	TW-32704-10		TW-32704-22		—	—

<sup>†</sup>These sensors have accuracy of ±1% full-scale. <sup>‡</sup>The PTFE models include 30" (76 cm) L cable assembly.

**TW-32704-52** Power cable assembly for Ryton® PPS and brass sensors only.

Measures 30" (76 cm) long. For use with an existing power supply

**TW-17080-12** NIST-traceable calibration for liquid flowmeters

### 2 Power Supply/Adapter

A power supply will be required to power the sensors listed above.

Description	120 VAC, 60 Hz		240 VAC, 50 Hz	
	Catalog number	Price	Catalog number	Price
For Ryton PPS and brass sensors	TW-32704-55		TW-32704-56	
For PTFE sensors	TW-32706-50		TW-32706-55	

### 3 Flow Display/Totalizer

This display/totalizer is compact so that it can be mounted almost anywhere. View flow rate or flow total—front-panel button lets you easily toggle between flow rate and total flow display. The totalizer can be reset either remotely or with the local reset button. Meter displays flow rate up to four digits, flow total up to eight digits.

Input pulses are translated using a scaling factor in the range of 0.001 to 9999. Select the scaling factor so that displayed flow rate and total are in your preferred engineering units: mL/min, GPM, or any other unit combination. Program the totalizer decimal point in one of five different positions. Operates on one 3 V lithium battery (included).

**TW-32704-40** Flow display/totalizer.

Use only with the flow sensors above

**TW-32704-50** Replacement battery, 3 V lithium

### Specifications for display/totalizer

**Input signal:** pulse

**Accuracy:** ±0.2%

**Type:** up counting

**Input impedance:** 27 kΩ at 3 VDC

**Display:** 8-digit LCD, 7/16"H

**Update time:** 0.7 seconds

**Operating temp:** 131°F (55°C) max

**Power:** internal battery, 3 V lithium (included)

**Battery life:** five years

**Dimensions:** 2 15/16"W x 1 9/16"H x 1 1/4"D (7.5 x 4.0 x 3.2 cm)

**Panel cutout:** 2 11/16"W x 1 5/16"H (6.8 x 3.3 cm)



32704-40

# Flowmeters Pelton Wheel

## Economical Modular Flow Rate Sensor Systems

### Ryton® PPS materials for use in aggressive and non-aggressive gas or liquid systems

- A range of available configurations to suit most applications
- Voltage output to monitor and record flow rates and totals
- Interface with data acquisition system

#### 1 Flow Sensors

These sensors are ideal for low-flow applications involving mildly acidic or slightly corrosive gases and liquids. Economically designed, sensors provide a single 0 to 5 VDC output signal. This single signal is ideal for simple, low-cost flow rate measurement or for integration of the sensor into an existing central control system.

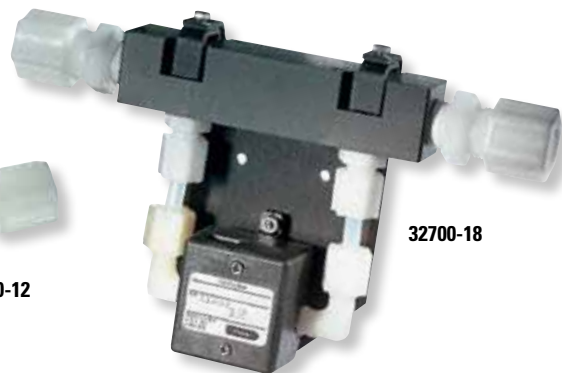
Ryton® PPS sensors are ideal for liquids or air. Sensors for liquids can be used with a wide variety of transparent, low-viscosity liquids under 10 cSt. Sensors measure a wide flow range from as low as 20 mL/min to as high as 500 L/min.

The wetted materials are epoxy, glass-filled polyphenylene sulfide (Ryton® PPS), glass, stainless steel, sapphire, and Viton®.

**Note:** A power supply is required for these flow sensors—order separately at right. If using an existing power supply, order cable assembly 32704-52 (below table).

### REQUIRED SYSTEM Components

- 1 Flow sensor
- 2 Power supply/adapter
- 3 Flow display/totalizer for local indication



### Specifications

**Max particulate size:** 25 microns

**Accuracy:** ±3% full-scale including linearity

**Accuracy coefficient, temperature:** ±0.2% per °C

**Accuracy coefficient, pressure:** ±0.07% per mm Hg (for air at 1 to 3 atm)

**Repeatability:** ±1% full-scale

**Operating temp:** 131°F (55°C) max

**Max system pressure**

For liquids: 100 psi (6.9 bar) at 20°C

For gases: 40 psi (2.7 bar) at 20°C

**Output signal:** 0 to 5 VDC

**Input power:** 10 to 15 VDC, 30 mA

**Dimensions:** (L x W x H, excluding fittings) 2 3/8" x 1 5/8" x 1 1/2" (6.0 x 4.1 x 3.8 cm)



#### 2 Power Supply/Adapters

A power supply will be required for the sensors listed at left.

**TW-32700-50 Power supply;** 120 VAC, 60 Hz

**TW-32700-55 Power supply;** 240 VAC, 50/60 Hz

#### 3 Flow Rate Indicators

**Miniature 3 1/2-Digit LCD.** View the 0.4" high digits in any flow unit combination to which the sensor output signal is scaled. Panel cutout is 1.665"L x 0.915"H (x 1.00"D). The input signal is 0 to 5 VDC.



**TW-32706-72 DC-powered display**

**Universal Rate/Totalizer/Batch Controllers.** For display of flow rates and totals plus options for doing batch process control. Displays in any engineering unit through a 1/8-DIN face. See page 657 for detailed information and other available models.

Description (relays and/or outputs)	115 VAC, 50/60 Hz		230 VAC, 50/60 Hz	
	Cat. no.	Price	Cat. no.	Price
None	<a href="#">TW-94787-00</a>		<a href="#">TW-94787-05</a>	
Two relays	<a href="#">TW-94787-40</a>		<a href="#">TW-94787-45</a>	
Two relays and 4 to 20 mA output	<a href="#">TW-94787-50</a>		<a href="#">TW-94787-55</a>	

**TW-05656-55 Benchtop stand** accepts 1/8-DIN meters. Tilt-back angle allows easy reading. Features nonslip rubber feet

**TW-50001-00 Line cord** with US standard plug, 6-ft (1.8-m) L. For 120 VAC operation

Catalog number	Flow rates	Connections (tube OD)	Pressure drop (max flow)	Price
<b>1 Ryton PPS sensors for liquids*</b>				
<a href="#">TW-32703-50</a>	13 to 100 mL/min	1/8"	10 psi	
<a href="#">TW-32703-52</a>	50 to 500 mL/min	1/4"	10 psi	
<a href="#">TW-32703-54</a>	100 to 1000 mL/min	1/4"	6 psi	
<a href="#">TW-32703-55</a>	0.2 to 2 LPM	1/4"	10 psi	
<a href="#">TW-32703-56</a>	0.5 to 5 LPM	3/8"	10 psi	
<a href="#">TW-32703-58</a>	1 to 10 LPM	3/8"	10 psi	
<b>1 Ryton PPS sensors for air</b>				
<a href="#">TW-32700-00</a>	20 to 100 mL/min	1/8"		
<a href="#">TW-32700-02</a>	40 to 200 mL/min	1/4"	10 psi	
<a href="#">TW-32700-04</a>	100 to 500 mL/min	1/4"		
<a href="#">TW-32700-06</a>	0.2 to 1 LPM	1/4"		
<a href="#">TW-32700-08</a>	0.4 to 2 LPM	1/4"	10 psi	
<a href="#">TW-32700-10</a>	1 to 5 LPM	1/4"		
<a href="#">TW-32700-12</a>	2 to 10 LPM	3/8"		
<a href="#">TW-32700-14</a>	4 to 20 LPM	3/8"	10 psi	
<a href="#">TW-32700-16</a>	10 to 50 LPM	3/8"		
<a href="#">TW-32700-18</a>	20 to 100 LPM	3/8"		
<a href="#">TW-32700-20</a>	40 to 200 LPM	1/2"	10 psi	
<a href="#">TW-32700-22</a>	100 to 500 LPM	1/2"		

\*Flow rates given are for water and other low-viscosity fluids less than 10 centistokes

**TW-32704-52 Power cable assembly,** 36" (0.9 m). Required when using an existing power supply



## High-Accuracy Stainless Steel Flowmeters / Transmitters

Economical design with an outstanding  $\pm 1.0\%$  full-scale accuracy

- A wide range of outputs options for integration into any system

### 1 Flowmeters/Transmitters

Select these flow meters and transmitters for extremely low flow-rate applications or for higher flow rate measurements and yet maintain a full-scale accuracy of  $\pm 1\%$  or better. All units feature a stainless steel housing and come standard with stainless steel compression fittings.

Choose transmitters with a 0 to 5 VDC or 4 to 20 mA output for control or data logging purposes. Models 32718-20 to -32 offer a single output (0 to 5 VDC) along with a built-in 3 1/2-digit display.

The flow meters/transmitters can be used with a wide variety of transparent, low-viscosity (under 10 cSt) corrosive or neutral liquids and solvents.

**Note:** A power supply is required for each meter/transmitter and may be ordered at right. If using an existing power supply, order cable assembly 32704-52 below the table.

### REQUIRED SYSTEM Components

- 1 Flowmeter/transmitter
- 2 Power supply adapter
- 3 Flow rate indicator (for units without built-in display)

Flowmeter with output 32718-20



Transmitter 32718-00



Transmitter 32718-40

### Specifications



**Max particulate size:** 25  $\mu$ m

**Accuracy:**  $\pm 1\%$  full-scale including linearity

**Accuracy coefficient, temperature:**  $\pm 0.2\%$  per  $^{\circ}$ C

**Repeatability:**  $\pm 0.2\%$  full-scale

**Operating temp:** 131 $^{\circ}$ F (55 $^{\circ}$ C)

**Max system pressure:** 500 psi (34.5 bar) at 20 $^{\circ}$ C

**Wetted parts:** 316L stainless steel, glass-filled polyphenylene sulfide (Ryton $^{\circ}$  PPS), glass, sapphire, epoxy and Viton $^{\circ}$

#### Output signal

Models 32718-00 to -09: 0 to 5 VDC  
Models 32718-20 to -32: 0 to 5 VDC,  
Models 32718-40 to -52: 4 to 20 mA

**Input power**  
Models 32718-00 to -32:  
12 VDC, 35 mA  
Models 32718-40 to -52:  
24 VDC, 50 mA

**Dimensions (L x W x H)**  
Models 32718-00 to -09:  
2 3/8" x 1 5/8" x 1 1/2" (6.0 x 4.1 x 3.8 cm)  
Models 32718-20 to -32:  
2 3/8" x 1 5/8" x 3" (6.0 x 4.1 x 7.6 cm)  
Models 32718-40 to -52:  
2 3/8" x 1 5/8" x 2 1/2" (6.0 x 4.1 x 5.9 cm)

Catalog number	Flow range	Connections (tube OD)	Pressure drop (max flow)	Price
<b>1 Transmitters with 0 to 5 VDC</b>				
<a href="#">TW-32718-00</a>	13 to 100 mL/min	1/8"	10 psi	
<a href="#">TW-32718-02</a>	20 to 200 mL/min	1/4"	10 psi	
<a href="#">TW-32718-04</a>	50 to 500 mL/min	1/4"	10 psi	
<a href="#">TW-32718-06</a>	0.1 to 1 LPM	1/4"	6 psi	
<a href="#">TW-32718-07</a>	0.2 to 2 LPM	1/4"	10 psi	
<a href="#">TW-32718-08</a>	0.5 to 5 LPM	3/8"	10 psi	
<a href="#">TW-32718-09</a>	1 to 10 LPM	3/8"	12 psi	
<b>1 Flowmeters with a 3 1/2-digit display and 0 to 5 VDC output</b>				
<a href="#">TW-32718-20</a>	13 to 100 mL/min	1/8"	10 psi	
<a href="#">TW-32718-22</a>	20 to 200 mL/min	1/4"	10 psi	
<a href="#">TW-32718-24</a>	50 to 500 mL/min	1/4"	10 psi	
<a href="#">TW-32718-26</a>	0.1 to 1 LPM	1/4"	6 psi	
<a href="#">TW-32718-28</a>	0.2 to 2 LPM	1/4"	10 psi	
<a href="#">TW-32718-30</a>	0.5 to 5 LPM	3/8"	10 psi	
<a href="#">TW-32718-32</a>	1 to 10 LPM	3/8"	12 psi	
<b>1 Transmitters with 4 to 20 mA output</b>				
<a href="#">TW-32718-40</a>	13 to 100 mL/min	1/8"	10 psi	
<a href="#">TW-32718-42</a>	20 to 200 mL/min	1/4"	10 psi	
<a href="#">TW-32718-44</a>	50 to 500 mL/min	1/4"	10 psi	
<a href="#">TW-32718-46</a>	0.1 to 1 LPM	1/4"	6 psi	
<a href="#">TW-32718-48</a>	0.2 to 2 LPM	1/4"	10 psi	
<a href="#">TW-32718-50</a>	0.5 to 5 LPM	3/8"	10 psi	
<a href="#">TW-32718-52</a>	1 to 10 LPM	3/8"	12 psi	

[TW-32704-52](#) Cable assembly for sensors; 30"L (0.9 m). Required when using your own power supply

### 2a Power Supplies (Transmitters 32718-00 to -09 and meters 32718-20 to -32)

A power supply is required for each meter/transmitter.

[TW-32704-55](#) Power supply; 120 VAC, 60 Hz to 12 VDC.

[TW-32704-56](#) Power supply; 240 VAC, 50 Hz to 12 VDC

### 2b Power Supply (Transmitters 32718-40 to -52)

Power supply is required for each transmitter.

[TW-32704-90](#) Power supply; 120 VAC, 60 Hz to 24 VDC

### 3 Displays

Select a flow rate/total display for use with the transmitters listed at left. Note the signal-input requirements for each.

**Miniature 3 1/2-Digit LCD.** This low-power device operates from an existing 5 to 24 VDC source. View the 0.4" high digits in any flow unit combination to which the transmitter output signal is scaled. Panel cutout is 1.67"L x 0.92"H (x 1.00"D). The input signal is 0 to 5 VDC.



32706-72

[TW-32706-72](#) DC-powered display

**Flow Display/Totalizer** shows flow rate up to four digits and total flow up to eight digits; select a scaling factor to display rates and totals in any desired engineering unit. Operates on one 3 V lithium battery (included). Panel cutout is 2 1/2"L x 1 1/4"H x 1 1/4"D (6.4 x 3.2 x 3.2 cm). Input signal is pulse.



32704-40

See page 635 for more details.

[TW-32704-40](#) Flow indicator/totalizer

[TW-32704-50](#) Replacement battery, 3 V lithium

[TW-17080-12](#) NIST-traceable calibration with data

### Find MORE!

Order an analog signal converter to convert the VDC output signal to an RS-232 signal on [page 627](#).

**Flowmeters**  
**Pelton Wheel**

**Liquid or Gas Turbine Flowmeters/Transmitters**

Output signal lets you connect to a remote display, data logger, or recorder for continuous monitoring

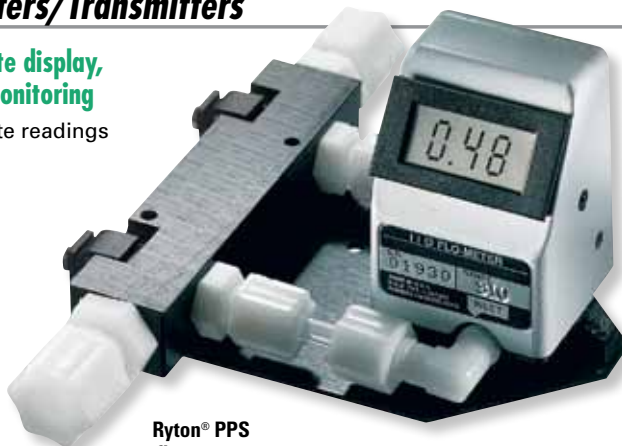
- The 3½-digit LCD provides direct flow rate readings

These low-flow liquid and air flowmeters are ideal for industrial, commercial, laboratory, or OEM applications. They are compact and offer excellent liquid or air measurements. All models provide direct flow rate readings in mL/min or L/min and a 0 to 5 VDC linear output.

Choose from Ryton® PPS or brass flowmeters. Ryton® PPS meters are an economical alternative to brass models. Order brass meters for high-pressure applications—meters withstand up to 500 psi. Use flowmeters for liquids with a wide variety of transparent, low viscosity (below 10 cSt) liquids. Flowmeters for air cover flow rates from 10 mL/min to 20 L/min.

Wetted materials are epoxy, glass-filled polyphenylene sulphide (Ryton® PPS), glass, stainless steel, sapphire, Viton®, and acetal (for Ryton® PPS flowmeters) or brass (for brass flowmeters).

Order base plate 32709-90 below right to allow Ryton® PPS flowmeters (except 32709-16) stand on their own. Power flowmeters with an AC adapter or a rechargeable battery kit; battery kit provides up to 20 hours of portability. If your application requires a remote display, see page 657 for our universal rate/totalizer/batch controllers.



Ryton® PPS flowmeter 32709-16



Ryton® PPS flowmeter 32709-08



Brass flowmeter 32709-28

**INNOCAL®**  
INNOVATIVE CALIBRATION SOLUTIONS

**Ensure the accuracy of your flowmeter!**

**TW-17080-00** NIST-traceable calibration with data for air/gas flowmeters

**TW-17080-12** NIST-traceable calibration with data for liquid flowmeters

**Specifications**

- Max particulate size:** 25 µm
- Accuracy:** ±1% full-scale including linearity for liquids; ±3% full-scale for air.
- Accuracy coefficient, temperature:** ±0.2% per °C
- Repeatability**  
Meters for liquids: ±0.2%, full-scale (20 to 100%)  
Meters for air: ±0.5%, full-scale (50 to 100%)
- Operating temp:** 0 to 55°C (32 to 131°F)

- Max system pressure**  
Ryton® PPS: 100 psi (6.9 bar) meters for liquids, 40 psi (2.7 bar) meters for air  
Brass: 500 psi (34.5 bar) meters for liquid; 40 psi (2.7 bar) meters for air
- Display:** 3½-digit LCD, 7/8"H
- Output signal:** 0 to 5 VDC
- Input power:** 12 VDC
- Dimensions (W x H x D):** 1 7/8" x 3" x 1 3/4" (4.8 x 7.6 x 4.4 cm), for models up to 5 L/min



Flow rates†	Connections (tube OD)	Pressure drop (max flow)	Ryton PPS flowmeters		Brass flowmeters	
			Catalog number	Price	Catalog number	Price
<b>Flowmeters for transparent liquids</b>						
13 to 100 mL/min	1/8"	10 psi	<a href="#">TW-32709-50</a>		<a href="#">TW-32709-70</a>	
20 to 200 mL/min	1/4"		<a href="#">TW-32709-52</a>		<a href="#">TW-32709-72</a>	
50 to 500 mL/min	1/4"		<a href="#">TW-32709-54</a>		<a href="#">TW-32709-74</a>	
0.1 to 1 L/min	1/4"	6 psi	<a href="#">TW-32709-56</a>		<a href="#">TW-32709-76</a>	
0.2 to 2 L/min	1/4"	10 psi	<a href="#">TW-32709-58</a>		<a href="#">TW-32709-78</a>	
0.5 to 5 L/min	3/8"	6 psi	<a href="#">TW-32709-60</a>		<a href="#">TW-32709-80</a>	
<b>Flowmeters for air</b>						
20 to 100 mL/min	1/8"	10 psi	<a href="#">TW-32709-02</a>		<a href="#">TW-32709-22</a>	
40 to 200 mL/min	1/8"		<a href="#">TW-32709-04</a>		<a href="#">TW-32709-24</a>	
100 to 500 mL/min	1/8"		<a href="#">TW-32709-06</a>		<a href="#">TW-32709-26</a>	
0.2 to 1 L/min	1/8"	10 psi	<a href="#">TW-32709-08</a>		<a href="#">TW-32709-28</a>	
0.4 to 2 L/min	1/4"		<a href="#">TW-32709-10</a>		<a href="#">TW-32709-30</a>	
1 to 5 L/min	1/4"	10 psi	<a href="#">TW-32709-12</a>		<a href="#">TW-32709-32</a>	
2 to 10 L/min	1/4"		<a href="#">TW-32709-14</a>		<a href="#">TW-32709-34</a>	
4 to 20 L/min	3/8"		<a href="#">TW-32709-16</a>		<a href="#">TW-32709-36</a>	

†Flow rates for air are given at 760 mm Hg and 23°C. Flow rates for liquids are given for water at 23°C.

**Accessories**

- TW-32709-90** Base plate for Ryton® PPS flowmeters (except 32709-16) at left. Allows meter to stand by itself. Base plate includes mounting screws
- TW-32709-92** AC adapter; 115 VAC, 50/60 Hz. Adapter includes signal output cable
- TW-32709-94** AC adapter; 230 VAC, 50/60 Hz. Adapter includes signal output cable
- TW-32709-96** Rechargeable battery kit, 115 VAC. Provides up to 20 hours of portable operation. Battery kit includes charger, cables, and carrying case
- TW-32704-52** Power cable assembly. Measures 30" (0.9 m) L. For use with an existing power supply

**Analog Signal-to-RS Converters** for collection and analysis of data on a PC. Includes software, a bidirectional A/D and D/A signal conditioner with switch for 0 to 5 VDC or 4 to 20 mA input, and 110 VAC power supply; uses screw terminal connections.

- TW-03277-70** Analog signal-to-RS-232 converter
- TW-03277-75** Analog signal-to-RS-485 converter





**Cole-Parmer® Ultra High-Accuracy Turbine Flowmeters/Transmitters**

**Provides ±0.5% full scale accuracy in a compact, in-line liquid flowmeter**

Select from economical Ryton® PPS construction, metal-free PPS models, or rugged brass to withstand up to 500 psi! Flowmeters simultaneously display flow rate plus provide a signal output for data logging or control. Power flowmeters with optional AC adapter sold separately.

**What's included:** NIST-traceable calibration report supplied by the manufacturer.

**Specifications**

- Max viscosity:** 10 cSt
- Max particulate size:** 10 microns
- Accuracy:** ±0.5% full-scale
- Accuracy coefficient, temperature:** ±0.2% per °C
- Repeatability:** ±0.2% full-scale
- Operating temp:** 41 to 131°F (5 to 55°C)
- Max system pressure**  
Ryton® PPS: 100 psi (6.9 bar)  
Brass: 500 psi (34.5 bar)

- Wetted parts**  
All models: glass, Viton®, epoxy paint, sapphire  
32714-00 to -16: Ryton® PPS, SS, acetal tube fittings  
32715-00 to -16: Ryton® PPS, PCTFE tube fittings  
32714-20 to -36: brass, SS, brass tube fittings
- Display:** 3 1/2-digit LCD, 7/8"H
- Output signal:** 0 to 5 VDC
- Input power:** 12 VDC, 35 mA max
- Dimensions (W x H x D):** 1 7/8" x 3" x 1 3/4"  
(4.8 x 7.6 x 4.4 cm)



Brass flowmeter 32714-26



Flow rates	Connections (Tube OD)	Press. drop (max flow)	Ryton PPS/SS		Ryton PPS/PCTFE		Brass/SS	
			Cat. no.	Price	Cat. no.	Price	Cat. no.	Price
13 to 100 mL/min	1/8"	10	<a href="#">TW-32714-00</a>		<a href="#">TW-32715-00</a>		<a href="#">TW-32714-20</a>	
20 to 200 mL/min	1/4"	10	<a href="#">TW-32714-02</a>		<a href="#">TW-32715-02</a>		<a href="#">TW-32714-22</a>	
50 to 500 mL/min	1/4"	10	<a href="#">TW-32714-04</a>		<a href="#">TW-32715-04</a>		<a href="#">TW-32714-24</a>	
0.1 to 1 LPM	1/4"	6	<a href="#">TW-32714-06</a>		<a href="#">TW-32715-06</a>		<a href="#">TW-32714-26</a>	
0.1 to 2 LPM	1/4"	10	<a href="#">TW-32714-08</a>		<a href="#">TW-32715-08</a>		<a href="#">TW-32714-28</a>	
0.2 to 5 LPM	3/8"	10	<a href="#">TW-32714-10</a>		<a href="#">TW-32715-10</a>		<a href="#">TW-32714-30</a>	
1 to 10 GPH	1/4"	10	<a href="#">TW-32714-14</a>		<a href="#">TW-32715-14</a>		<a href="#">TW-32714-34</a>	
4 to 100 GPH	3/8"	10	<a href="#">TW-32714-16</a>		<a href="#">TW-32715-16</a>		<a href="#">TW-32714-36</a>	

**Accessories**

- [TW-32709-92 AC adapter](#); 115 VAC, 50/60 Hz. Includes signal output cable
- [TW-32709-94 AC adapter](#); 230 VAC, 50/60 Hz. Includes signal output cable
- [TW-32704-52 Power cable assembly](#); for Ryton® PPS and brass sensors only. Measures 30" (76 cm) long. For use with an existing power supply

**NSF-Approved Turbine Flowmeters**

**Designed for low-viscosity flow measurement in water and beverage applications**

- NSF Standard 61 listed

Designed for low-flow OEM and pilot applications, these turbine flowmeters are highly accurate and repeatable and feature a Hall effect sensor for superior accuracy. The sensor's standard power and output specifications make it easy to retrofit existing controllers and output to a PLC, recorder, or panel meter. The 316 stainless steel shaft coupled with Delrin® acetal bearings allows for accurate measurements during quick dispensing cycles. These low-cost units meet the requirements of NSF Standard 61, making them ideal for water or beverage dispensing applications or any application with water-based liquids.

**Specifications**

- Process connection:** 3/8" NPT(M)
- Accuracy:** ±2% of reading
- Repeatability:** ±0.5% of reading
- Viscosity:** 32 to 81 SSU (1.8 to 16 cSt)
- Max. particulate size:** 50 microns
- Pressure:** Operating: 200 psi (13.6 bar)  
Burst: 1000 psi (68 bar)
- Wetted materials:** Noryl, nylon, 316 stainless steel, Delrin acetal
- Operating temperature:** -4 to 176°F (-20 to 80°C)
- Input power:** 5 to 24 VDC @ 8 mA
- Output (Hz):** NPN sinking open collector @ 25 mA maximum leakage current 10 µA (5k to 30k pull-up resistor required)
- Electrical connection:** 3-ft (0.9-m) PVC cable, #22 AWG



Catalog number	Flow range GPM (LPM)	Frequency range	Pulses per gallon (liter)	Price
<a href="#">TW-98516-90</a>	0.2 to 2 (0.8 to 7.6)	34 to 343 Hz	10,313 (2724)	
<a href="#">TW-98516-92</a>	0.4 to 4 (1.5 to 15)	29 to 343 Hz	4994 (1319)	

[TW-17080-12](#) NIST-traceable recalibration with data

**NEW**

98516-90





# Flowmeters

## Turbine

### PFA, PVDF, and 316L Stainless Steel Turbine Flow Sensors

Use in conjunction with batch or flow controller for precise pump control

- PFA sensors meet requirements of US Pharmacopeia Class VI standard

These liquid turbine flow sensors are corrosion resistant for long-term, trouble-free performance in demanding situations. Sensor is positioned in close proximity to the edges of the rotor blades to provide accurate flow measurements for all colored liquids. Flow in your tubing is picked up via the IR beam in the sensor connection, and converted into a 5 to 30 V square wave pulse output. One meter of PVC cable is included with an RVC jack for input into the batch or flow controllers (sold separately below). If using a recorder, panel meter, or PLC, simply remove the jack to expose the two-wire cable for installation of voltage output.

Mount these turbine flow sensors in any position; they do not require a flow straightener or other specialized installation. The PFA and PVDF sensors are replaceable for single-use applications or can be set up as permanent flow sensors. PFA and PVDF sensors come standard with a mounting clip; polypropylene tube holders are sold separately below.

**PFA Turbine Sensors** incorporate hose barb connections for lab or process use. Sensors are ideal for disposable single-use and sterile applications, but can also be used in permanent flow sensing applications. PFA sensors are suitable for clear and opaque, neutral, corrosive, and aggressive liquids and fuel.

**PVDF Turbine Sensors** are available with hose barb connections for lab or process use. PVDF sensors are generally used in applications requiring high-purity flow sensing of solvents, acids, and bases.

**316L Stainless Steel (SS) Turbine Sensors** are rated for high-pressure requirements in chemical, pharmaceutical, semiconductor, and environmental industries. Highly corrosion resistant.

**NEW**



#### Specifications

- Accuracy:** ±1% of reading
- Repeatability:** <0.15%
- Fluid type:** clear and opaque, neutral, corrosive, and aggressive liquids
- Viscosity:** 0.8 to 10 cSt
- Operating temperature:** -4 to 176°F (-20 to 80°C)
- Output signal:** 5 to 30 VDC square wave
- Power:** 5 to 30 VDC
- Electrical connection:** 3.3-ft (1-m) PVC RVC jack

Catalog number	Flow range (L/min)	Inner diameter (mm)	Maximum pressure psi (bar)	Wetted materials	Process connections	Price	Replacement turbine	
							Catalog number	Price
<b>PFA turbine sensors</b>								
TW-32516-00	0.06 to 2	4.5	290 (20)	PFA, ruby	7-mm ID hose barb		TW-32516-18	
TW-32516-02	0.5 to 20	8.5	218 (15)		12-mm ID hose barb		TW-32516-20	
<b>PVDF turbine sensors</b>								
TW-32516-04	0.03 to 2	4.7	363 (25)	PVDF, ruby	7-mm ID hose barb		TW-32516-22	
TW-32516-06	0.3 to 20	9.3	290 (20)		12-mm ID hose barb		TW-32516-24	
<b>316L stainless steel turbine sensors</b>								
TW-32516-12	0.06 to 2	4.5	363 (25)	316L SS, PFA, ruby	¼" NPT(M)		—	—
TW-32516-14	0.5 to 20	8.5	363 (25)		⅜" NPT(M)		—	—
TW-32516-16	1.5 to 40	12.5	363 (25)		½" NPT(M)		—	—

**TW-32516-30 Polypropylene tube holder** for PFA and PVDF turbine sensors, used with skid mounting

#### Batch and Flow Controllers for Pumps

These pumps controllers can be used with any pump that takes a 4 to 20 mA input signal. Sensors relay flow to controller which then transmits a signal to the pump if a change in flow is required. Controllers read flow input and display current and total flow velocity.

Batch controller is designed for batching, filling, and dosing with preset functions. Flow input controller is designed to display and control current and total flow velocity. Programming is simple with four large tactile buttons. Controllers also have a power down safe mode, 24 VDC power supply, and Ethernet communications.



Batch Controller 32516-26

#### Specifications

- Input**  
Batch controller: two 5 to 30 volt square wave pulses  
Pump controller: one 5 to 30 volt square wave pulse
- Output:** 4 to 20 mA and audible buzzer
- Operation**  
Batch controller: batching, dosing, filling, mixing, and totalizing with external start and stop  
Pump controller: pump speed control
- Display:** 2 x 16 character LCD

Catalog number	Description	Price
TW-32516-26	Dual-flow input batch controller	
TW-32516-28	Single-flow input controller	



## PVDF Infrared Turbine Flow Sensors

### Place in any orientation without flow straighteners

- Fluid bearing minimizes friction and component wear

These infrared sensors feature a unique turbine design that prevents air or gas bubbles from being trapped in the measuring chamber leading to improved accuracy and repeatability. The design also utilizes a fluid bearing and operates virtually friction free, minimizing component wear. The rotor assembly is removable for cleaning or replacement of the flow tube. For protection from particulates, all models include a 100 µm filter screen.

**Note:** these sensors cannot be used with opaque fluids.



### Specifications

**Fluid type:** clear or translucent fluids capable of transmitting IR light; 1 to 15 cSt viscosity

**Max particulate size:** 100 µm

**Accuracy:** ±1% of reading

**Linearity:** ±1%

**Repeatability:** ±0.1%

**Operating temp:** -40 to 185°F (-40 to 85°C)

**Max system pressure:** 150 psi (10.3 bar) at 185°F (85°C)

**Wetted materials:** PVDF, PFA, Viton®

**Output signal:** square wave pulse, open collector

**Input power:** 8 to 24 VDC; 6 to 24 mA

**Cable length:** 3 m (9.8 ft)



Catalog number	Flow range (GPM)	Frequency range (Hz)	Connections (hose barb)	Pressure drop at 50% flow	Sensor length	Price
<a href="#">TW-32250-02</a>	0.03 to 0.53	60 to 1200	1/4"		3 3/4" (9.5 cm)	
<a href="#">TW-32250-12</a>	0.08 to 2.38	40 to 1200	3/8"	6.4 psi	4 9/8" (11.1 cm)	
<a href="#">TW-32250-22</a>	0.13 to 3.96	26.7 to 800	7/16"		4 1/2" (11.4 cm)	
<a href="#">TW-32250-32</a>	0.26 to 7.93	20 to 600	5/8"		5 5/8" (13.7 cm)	
<a href="#">TW-32250-42</a>	0.66 to 19.8	18.8 to 562	3/4"	6.4 psi	5 1/4" (13.3 cm)	
<a href="#">TW-32250-52</a>	1.06 to 32.0	15 to 450	7/8"		5 1/4" (13.3 cm)	

[TW-17080-12](#) NIST-traceable calibration

## PVDF Turbine Flowmeters/Totalizers

### Ideal for use with many strong oxidizers and acids†

- Battery-powered to eliminate the need for expensive wiring
- Two totalizers allow for process or period-specific volume monitoring
- Enclosure is FM-approved for Class I, Division I environments

These in-line flowmeters/totalizers display flow rate and accumulated flow in GPM or LPM. The NEMA 4 enclosure is suitable for indoor/outdoor use in dusty, dirty, and wet environments and the PVDF body is resistant to ultraviolet radiation and weathering.

All flowmeters measure linearly across a range and record a cumulative volume plus a resettable volume. Meters are factory-calibrated using water but can store two application-specific K-factors determined in-process. To conserve power, the six-digit display automatically turns on with flow and then turns off four minutes after flow ceases.

Wetted components are PVDF housing, rotor, and supports, and ceramic shaft and bearings. The limited internal parts are simple to replace for easy maintenance—contact our Application Specialists for details.

Meters operate on two lithium batteries. Remote installation of the flowmeter body is possible using the optional remote installation kit (order separately at right). Replacement battery kits and calibration containers can be ordered from "Accessories" at right.



Flowmeter/totalizer  
05610-12

†Check chemical resistance charts on pages 2030-2038 for specific details.

### Specifications

**Repeatability:** ±0.3% of reading

**Operating temp:** 14 to 140°F (-10 to 60°C)

**Max system pressure:** 150 psi (10.3 bar)

**Wetted materials:** PVDF retainers, ceramic bearings, ceramic shafts, PVDF rotor and supports, Viton® O-rings, PVDF housing.



**Display:** 6-digit LCD, 1/2"H (with floating decimal)

**Input power:** two 3 V lithium batteries

**Battery life:** 9000 hours nominal

**Dimensions (L x W x H):** 8" x 2 3/4" x 3" (20.3 x 7.0 x 7.6 cm)

**Approvals:** EEx II 3 G IIC T4

Catalog number	Flow range		Connections	Accuracy	Pressure drop (linear range)	Price
	Linear	Maximum				
<a href="#">TW-05610-11</a>	1.2 to 12.0 GPM (4.5 to 45.4 LPM)	15.0 GPM (56.8 LPM)	1/2" NPT(F)	±2% of reading	10 psi	
<a href="#">TW-05610-12</a>	5 to 50.0 GPM (18.9 to 190.0 LPM)	75.0 GPM (284.0 LPM)	1" NPT(F)	±1.5% of reading	6 psi	

### Accessories

[TW-05610-70](#) Calibration container, HDPE, 5-gallon capacity

[TW-05610-96](#) Repl. battery kit

**Remote Installation Kit.** Mount display up to 100 feet from the sensor—ideal for measuring flow in hot pipes (up to 250°F/121°C) or in inaccessible areas. Kit includes a sensor cover with 10-ft cable, remote display housing, and installation hardware. FM-approved.

[TW-05609-93](#) Remote installation kit

[TW-05609-91](#) Output module, pulse output. Module provides a digital open collector output for interfacing with compatible instrumentation

[TW-05609-92](#) Output module, 4 to 20 mA or 5 to 20 volts. Module provides an output for interfacing with compatible instrumentation

[TW-17080-12](#) NIST-traceable calibration



# Flowmeters

## Turbine

### Heavy-Duty Flowmeters/Totalizers

#### Battery power eliminates the need for expensive wiring

- Two totalizers allow for process or period-specific volume monitoring
- FM-approved for Class I, Division I environments

These heavy-duty in-line flowmeters/totalizers display flow rate and accumulated flow in gallons or liters. The compact, yet robust design makes them ideal for use in manufacturing, pilot-plant, or quality control areas.

All flowmeters measure linearly across a range and record a cumulative volume plus a resettable volume. Meters are factory-calibrated using water but can store two application-specific K-factors determined in process. To conserve power, the six-digit display automatically turns on with flow and then turns off four minutes after flow ceases. The internal parts are simple to replace for easy maintenance—contact our Application Specialists for details.

Meters operate on two lithium batteries (included). Remote installation of the flowmeter body is possible using the optional remote installation kit 05609-93 (order separately below). Calibration containers and replacement battery kits can be ordered below.



Flowmeter 05609-17  
with sanitary Tri-Clover® connection



Flowmeter 05609-23  
with NPT(F) connection

#### Specifications

##### Maximum particulate size

Models with ≤50 GPM (190 LPM) max flow rate: 125 µm  
Models with >50 GPM (190 LPM) max flow rate: 500 µm

##### Repeatability: ±0.1% of reading

##### Maximum pressure

Aluminum: 300 psig (21 bar); NPT SS: 1500 psig (105 bar);  
Tri-Clover SS: 450 psig (31 bar); Flanged SS: 285 psig (19 bar)

Operating temp: 14 to 140°F (-10 to 60°C)

Wetted materials: 316 SS or aluminum housing, PVDF rotor and supports, tungsten carbide shaft, 316 SS retainers, and ceramic bearings



Display: 6-digit LCD, 1/2"H (with floating decimal)  
Input power: two 3 V lithium batteries (included)  
Battery life: 9000 hours nominal  
Approvals: EEx II 3 G IIC T4

Catalog number	Flow range	Connections	Body material	Accuracy	Dimensions (W x H x D)	Price
<a href="#">TW-05609-01</a> <a href="#">TW-05609-03</a> <a href="#">TW-05609-05</a>	1 to 10 GPM (3.8 to 37.9 LPM)	1/2" NPT(F) 1/2" NPT(F) 3/4" Tri-Clover†	Aluminum 316 SS 316 SS	±2% of rdg	4 1/2" x 2" x 1 7/8" (11.4 x 5.1 x 4.8 cm) 4 1/2" x 2" x 1 7/8" (11.4 x 5.1 x 4.8 cm) 5" x 2" x 1 7/8" (12.7 x 5.1 x 4.8 cm)	
<a href="#">TW-05609-07</a> <a href="#">TW-05609-09</a> <a href="#">TW-05609-11</a>	2 to 20 GPM (7.6 to 75.7 LPM)	3/4" NPT(F) 3/4" NPT(F) 1" Tri-Clover†	Aluminum 316 SS 316 SS	±2.0% of rdg	4 3/8" x 2" x 2" (11.1 x 5.1 x 5.1 cm) 4 3/8" x 2" x 2" (11.1 x 5.1 x 5.1 cm) 5" x 2" x 2" (12.7 x 5.1 x 5.1 cm)	
<a href="#">TW-05609-13</a> <a href="#">TW-05609-15</a> <a href="#">TW-05609-17</a> <a href="#">TW-05609-19</a>	5 to 50 GPM (18.9 to 190 LPM)	1" NPT(F) 1" NPT(F) 1 1/2" Tri-Clover† 1" ANSI‡	Aluminum 316 SS 316 SS 316 SS	±1.5% of rdg	4 1/2" x 2" x 2 1/4" (11.4 x 5.1 x 5.7 cm) 4 1/2" x 2" x 2 1/4" (11.4 x 5.1 x 5.7 cm) 5 1/2" x 2" x 2 1/4" (14.0 x 5.1 x 5.7 cm) 4 3/4" x 4 1/4" x 4 1/4" (12.1 x 10.8 x 10.8 cm)	
<a href="#">TW-05609-21</a> <a href="#">TW-05609-23</a> <a href="#">TW-05609-25</a> <a href="#">TW-05609-27</a>	10 to 100 GPM (38 to 380 LPM)	1 1/2" NPT(F) 1 1/2" NPT(F) 2" Tri-Clover† 1 1/2" ANSI‡	Aluminum 316 SS 316 SS 316 SS	±1% of rdg	5 3/8" x 2 3/4" x 2 1/8" (13.7 x 7.0 x 7.3 cm) 5 3/8" x 2 3/4" x 2 1/8" (13.7 x 7.0 x 7.3 cm) 6 1/2" x 2 3/4" x 2 1/8" (16.5 x 7.0 x 7.3 cm) 8" x 5" x 5" (20.3 x 12.7 x 12.7 cm)	
<a href="#">TW-05609-29</a> <a href="#">TW-05609-31</a> <a href="#">TW-05609-33</a> <a href="#">TW-05609-35</a>	20 to 200 GPM (6 to 760 LPM)	2" NPT(F) 2" NPT(F) 2 1/2" Tri-Clover† 2" ANSI‡	Aluminum 316 SS 316 SS 316 SS	±1% of rdg	6 3/8" x 3 3/8" x 3 1/4" (16.2 x 8.6 x 8.3 cm) 6 3/8" x 3 3/8" x 3 1/4" (16.2 x 8.6 x 8.3 cm) 7" x 3 3/8" x 3 1/4" (17.8 x 8.6 x 8.3 cm) 9 1/2" x 6" x 6" (24.1 x 15.2 x 15.2 cm)	

†Sanitary flange    ‡150# ANSI flange

[TW-05610-70](#) Calibration container; HDPE, 5-gallon capacity

[TW-05610-96](#) Replacement battery kit

[TW-05609-93](#) Remote installation kit. Mount display up to 100 feet from the sensor—ideal for measuring flow in hot pipes (up to 250°F/121°C) or in inaccessible areas. Kit includes a sensor cover with 10-ft cable, remote display housing, and installation hardware. FM-approved

[TW-05609-91](#) Output module, pulse output. Module provides a digital open collector output for interfacing with compatible instrumentation

[TW-05609-92](#) Output module, 4 to 20 mA or 5 to 20 volts. Module provides an output for interfacing with compatible instrumentation

[TW-17080-12](#) NIST-traceable calibration with data

**Low-Power Flow Sensors and Meters**

**Display versions designed for use in hazardous process environments**

- Battery-powered displays—no wiring required and intrinsically safe
- Large display face is easily readable from a distance
- NEMA 4X enclosure is ideal for wet process environments

The sensors feature 316 stainless steel (SS) body with 416 SS rotor and abrasion-resistant tungsten carbide bearings and shaft to endure corrosive water or other aggressive fluids. All sensors include flow straighteners for stabilizing turbulent flow allowing sensors to be mounted in any position<sup>1</sup>.

Select from flow sensor or flowmeters with display. Use sensors with an existing monitor. Sensors feature a preamplifier that must be powered and provides an output signal at distances up to 1000 feet. To interface the flow sensor, order multipin cable 32249-95 (listed below the table). For the flowmeter with remote display, the sensor may be located up to 10 feet away from the display.

<sup>1</sup>For highest accuracy, allow at least ten pipe diameters upstream and five on downstream.

Flowmeter  
32249-68



**Specifications**

**Sensors (all models)**

**Fluid type:** water-like; up to 30 cp  
**Max particulate size**  
 Models 32249-30, -72, and -92: 2000 µm  
 All other models: 250 µm  
**Accuracy:**  
 ±1% of reading

**Repeatability:** ±0.1%  
**Operating temp:** -100 to 325°F (-73 to 163°C)  
**Max pressure:** 5000 psi (344 bar)  
**Input power** (sensors only): 5 to 30 VDC  
**Output signal** (sensors only): Square wave pulse, 30 mV to 3 V peak-to-peak

**Display (models 32249-60 through -92)**

**Operating temperature:**  
 -22 to 158°F (-30 to 70°C)  
**Electrical classification**  
 CSA Hazardous:  
 Cl. I, Div. I, Grp. B/C/D;  
 Cl. II, Grp. E/F/G  
 CSA Intrinsically Safe:  
 Cl. I, Div. I, Grp. C/D;  
 Cl. II, Div. I, Grp. E/F/G  
**Enclosure rating:** NEMA/UL/CSA Type 4/IP67  
**Display type:** 8-digit, 0.7" numeric (upper line); 8-character, 0.35" alphanumeric (lower line) LCD  
**Input power:** one "D" size 1.5 V alkaline battery (included)



**Sensor Data**

Connections	Pulse output (pulse/gal.)	Sensor length	Pressure drop at max flow
1/2" NPT/3 GPM	20,000	3"	1.2 psi
1/2" NPT/15 GPM	3,300	3"	21 psi
1" NPT	870	4"	20 psi
2" NPT	52	6"	20 psi

Flow range (GPM)	Connections	Flow sensors		Flow sensors with mounted display		Flow sensors with remote display	
		Cat. no.	Price	Cat. no.	Price	Cat. no.	Price
0.3 to 3 2 to 15	1/2" NPT(M)	TW-32249-00		TW-32249-60		TW-32249-80	
		TW-32249-10		TW-32249-64		TW-32249-84	
5 to 50 40 to 400	1" NPT(M)	TW-32249-20		TW-32249-68		TW-32249-88	
		TW-32249-30		TW-32249-72		TW-32249-92	

**TW-32249-95 Cable**, 10-ft (3 m) length with 3-pin connector. Connects flow sensors to a remote display/controller

**Commercial Grade Flowmeters/Totalizers**

**Superb accuracy for low-flow applications**

- Battery-powered to eliminate the need for expensive wiring
- Two totalizers allow for process or period-specific volume monitoring

These general purpose in-line flowmeters/totalizers display flow rate and accumulated flow in GPM or LPM. The NEMA enclosure is suitable for indoor/outdoor use in dusty, dirty, and wet environments. The compact design makes them ideal for use in light manufacturing, pilot-plant, or quality control areas. Meters are factory-calibrated using water but can store two application-specific K-factors determined in process. Wetted components are the nylon or aluminum housing, nylon rotor, tungsten carbide shaft, 316 SS rings, and ceramic bearings. Order calibration containers to easily calibrate your flow meters.



Flowmeter/totalizer  
05610-04

**Specifications**

**Accuracy:** ±1.5% of reading  
**Operating temp:** 14 to 140°F (-10 to 60°C)  
**Display type:** 6-digit LCD, 1/2"H (with floating decimal)

**Input power:** two 3 V lithium batteries  
**Battery life:** 9000 hours nominal



**Dimensions (L x W x H):**  
 4" x 2" x 2 1/2" (10.2 x 5.1 x 6.4 cm)  
**Approvals:** EEx II 3 G IIC T4

Catalog number	Flow range	Connections	Housing material	Maximum pressure	Repeatability	Pressure drop at max flow	Maximum particulate size	Price
TW-05610-01	0.3 to 3.0 GPM (1 to 10 LPM)	1" NPT(F)	Nylon	150 psi (10.3 bar)	±1%	8 psig	125 microns	
TW-05610-02			Aluminum	300 psi (20.7 bar)				
TW-05610-04	3 to 50 GPM (10 to 190 LPM)	1" NPT(F)	Nylon	150 psi (10.3 bar)	±0.2%	5 psig	500 microns	
TW-05610-06			Aluminum	300 psi (20.7 bar)				
TW-05610-08	30 to 300 GPM (100 to 1000 LPM)	2" NPT(F)	Aluminum	300 psi (20.7 bar)	±0.2%	4 psig	500 microns	

**TW-05610-96 Replacement battery kit**

**TW-17080-12 NIST-traceable calibration with data**

**TW-05610-70 Calibration container;** HDPE, 5-gal. capacity



## Schedule 80 PVC Turbine Flowmeters/Totalizers

### Exceptional performance in a heavy-duty schedule 80 PVC housing

- Choose from units with battery-powered 6-digit display or pulse output
- Gallon and liter measurement units

These durable meters offer accuracy at a reasonable price for measuring water and are available in flow ranges from 1 to 200 GPM and 1/2" to 2" fitting sizes. Meters with display indicate totalization and rate of flow, and offer digital indication powered by two replaceable lithium batteries. Meters read up to 999,999 gallons or liters—switch between gallon and liter and the electronics will indicate accurately in both units of measure.

Flowmeters are available with male spigot or NPT(F) fittings, and install easily into existing PVC plumbed systems. Factory calibrated to water, this economical meter can be field calibrated to other low-viscosity fluids. Connections up to 4" are available. Contact an Application Specialist or go to ColeParmer.com.

### Specifications

**Max particulate size:** 125 µm  
**Media type:** water  
**Accuracy:** ±3.0% of reading  
**Operating temperature:** 32 to 140°F (0 to 60°C)  
**Operating pressure:** 150 psig (10.3 bar) at 73°F

**Wetted materials:** PVC housing, ceramic bearings, tungsten carbide shaft, PVDF rotor, and 316 SS rings  
**Power:** Models with display: two 3 V lithium batteries (included)  
 Models with pulse output: 9 to 35 VDC



05611-17



05611-52



Meter shown with 90° adapter kit 05611-90

Flow Range		Connections	Meters with display and no output		Meters with pulse output and no display	
GPM	LPM		Cat. no.	Price	Cat. no.	Price
1 to 10	3.8 to 38	1/2" male spigot 1/2" NPT(F)	TW-05611-10		TW-05611-50	
			TW-05611-15		TW-05611-51	
2 to 20	7.6 to 76	3/4" male spigot 3/4" NPT(F)	TW-05611-11		TW-05611-52	
			TW-05611-16		TW-05611-53	
5 to 50	19 to 190	1" male spigot 1" NPT(F)	TW-05611-12		TW-05611-54	
			TW-05611-17		TW-05611-55	
10 to 100	38 to 380	1 1/2" male spigot 1 1/2" NPT(F)	TW-05611-13		TW-05611-56	
			TW-05611-18		TW-05611-57	
20 to 200	76 to 760	2" male spigot 2" NPT(F)	TW-05611-14		TW-05611-58	
			TW-05611-19		TW-05611-59	

TW-05611-90 90° Adapter kit allows you to mount horizontal meters on vertical pipes. Includes O-ring, hardware, and foam spacers  
 TW-17080-12 NIST-traceable calibration with data

## Economical Totalizing Turbine Flowmeters

### Easy-to-read LCD displays batch or cumulative totals

- Simple, small, and sturdy
- Mount on hose or in-line

Measure batch and cumulative totals in liquid transfer systems with these sturdy meters. Nylon meter is designed to measure water. Aluminum meter is designed to measure petroleum fuels. Meters can be used on any pump, pressure, or gravity feed system. The batch total can be reset to measure flow for a single use. The cumulative total will automatically reset to zero when the maximum reading of 9999 is met.

### Specifications

**Max particulate size:** 30 µm  
**Accuracy:** ±5% full-scale  
**Repeatability:** ±5% full-scale  
**Connections:** 1" NPT(F)  
**Operating temperature:** 14 to 130°F (-10 to 55°C)

**Display type:** 6-digit LCD, 5/8"H  
**Power:** two AAA batteries (included)  
**Battery life:** 5000 hours  
**Dimensions (L x W x H):** 4" x 2" x 2 1/2" (10.2 x 5.1 x 6.4 cm)



05611-22



Catalog number	Flow range	Body material	Media type	Max pressure	Price
TW-05611-22	3 to 30 GPM (10 to 100 LPM)	Nylon	Water	150 psi (10.3 bar)	
TW-05611-24		Aluminum	Fuel	300 psi (20.7 bar)	

TW-09376-00 Replacement batteries; AAA, 1.5 V. Pack of 12  
 TW-17080-12 NIST-traceable calibration with data

# Flowmeters Paddle Wheel

## Flowmeter Systems

Sensors, monitors, controllers, and installation fittings—the guide at right can direct you to a full array of components that are designed to work seamlessly in any custom arrangement that you choose. The example (below right) highlights a common system application for numerous industries. This is only the beginning, there are an infinite number of component combinations to match your needs.

Reference the table below for suitable flow ranges of each sensor type. The guide at right lists the location of additional components to complete a system. As always, please feel free to contact an Application Specialist for additional technical support.

**Flow Ranges** for flow sensors on page 647.

Pipe ID	Flow range (GPM)		
	Low-flow Rotor-X™	Standard Rotor-X™	Metalex™
½"	0.3 to 19	1 to 19	1.6 to 19
¾"	0.5 to 34	1.7 to 34	2.7 to 34
1"	0.8 to 54	2.7 to 54	4.4 to 54
1¼"	1.4 to 94	4.7 to 94	7.4 to 94
1½"	1.9 to 127	6.4 to 127	10.1 to 127
2"	3.2 to 210	10.6 to 210	16.8 to 210
2½"	4.5 to 300	15 to 300	24 to 300
3"	7 to 461	24 to 461	37 to 461
4"	12 to 794	40 to 794	63 to 794
5"	19 to 1247	63 to 1247	100 to 1247
6"	27 to 1801	91 to 1801	144 to 1801
8"	47 to 3119	156 to 3119	250 to 3119
10"	74 to 4915	246 to 4915	393 to 4915
12"	105 to 6977	349 to 6977	559 to 6977

### REQUIRED SYSTEM Components

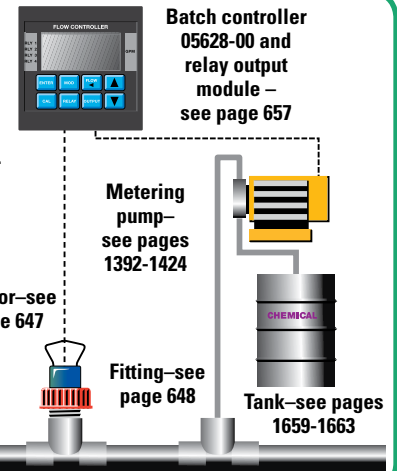
- 1 Flow sensor ..... 647
- 2 Installation fitting..... 648
- 3 Monitor or controller..... 657



### Example of a chemical proportioning system using these Flow Systems

**Chemical Proportioning System** allows for an accurate volumetric ratio to be maintained between the process liquid volume and the chemical injection volume. Real applications include injection or introduction of:

- Vitamins into farm animal drinking water
- Sodium hypochlorite disinfectant into water
- Fertilizer into irrigation water
- Bio-engineered organisms into liquids for manufacturing products such as man-made snow, soaps for large laundries, defoaming chemicals, and insecticides.

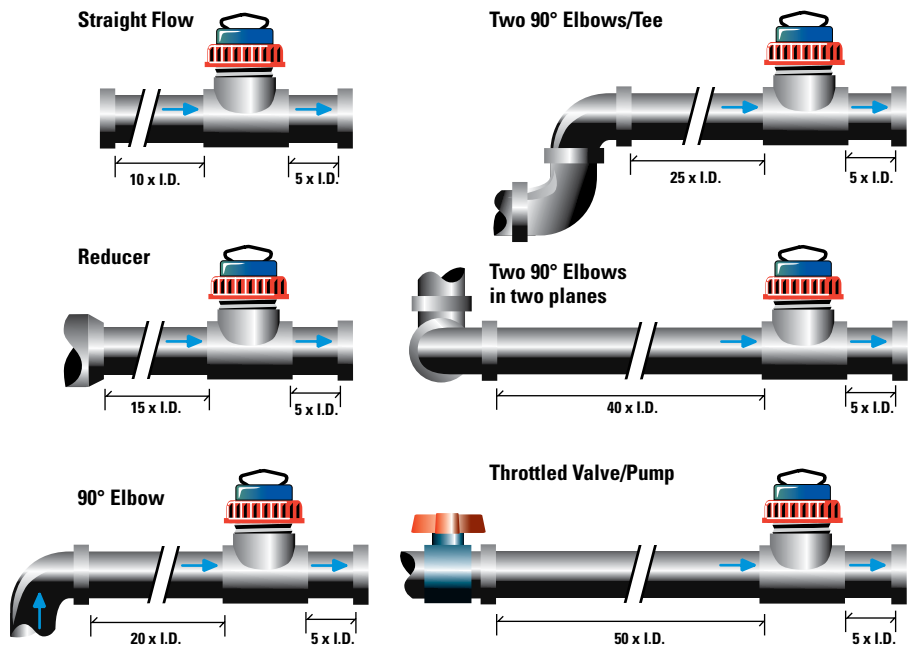
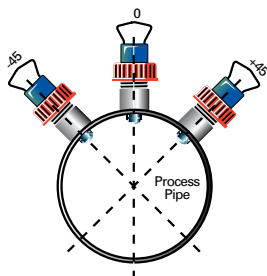


### Installing Your Flow Sensor

For best results, allow a straight run of pipe before and after the sensor after any bends, valves, or flow restrictions.

Stated accuracy is not guaranteed unless the Signet installation fittings on page 648 are used. The installation fitting ensures proper paddle depth and orientation.

In horizontal pipe runs with no air pockets or sediments present, mount the sensor/fitting in the 12 o'clock or 6 o'clock position. If sediment or air pockets are present, tilt the sensor/fitting at a maximum angle of 45° to avoid these obstacles. Vertical runs require upward flow. Pipes must be full.





**Low-Flow Rotor-X™ Sensors**

**Measure low flow rates with better resolution**

Measure a wider flow range with these high-quality designs. The rotor has an open core design to eliminate cavitation, to reduce drag on the paddle and to minimize pressure drop within the system. Less refined products in the market will use solid paddlewheels that can produce a non-linear and non-repeatable signal.

The design is suitable for measuring flow from 0.3 to 20 feet/second. Unlike basic paddle designs, this sensor includes a magnet in each paddle—4 total—for much higher resolution throughout the linear measuring range. Without amplification, the output signal can be transmitted up to 1000 feet.

This sensor is offered in materials to resist most chemicals. Select from glass-filled polypropylene or natural PVDF. All sensors have a PVDF rotor and Viton® O-ring. An integrated 25-foot signal cable is included for wiring the sensor into most systems.

These sensors may be mounted in any pipe that is compatible with the installation fittings on the following page. Rotor-X low-flow sensors are compatible with all of the line-powered displays, totalizers and controllers listed on page 657.



32500-00

**Rotor-X™ Sensors**

**Economical version of a proven design**

This sensor's rotor has an open core design to eliminate cavitation, to reduce drag on the paddle, and to minimize pressure drop within the system. Less refined products in the market will use solid paddlewheels that can produce a nonlinear and nonrepeatable signal.

The design is suitable for measuring flow from 1 to 20 feet/second. This paddle design includes a magnet in two opposite paddles for good resolution throughout the measuring range. Without amplification, the output signal can be transmitted up to 200 feet. As an FM-approved device, this sensor may be installed in hazardous locations.

This sensor is offered in materials to resist most chemicals. Select from glass-filled polypropylene or natural PVDF. All sensors have a PVDF rotor and Viton® O-ring. An integrated 25-foot signal cable is included for wiring the sensor into most systems.

These sensors may be mounted in any pipe that is compatible with the installation fittings on the following page. Rotor-X sensors are compatible with all of the line-powered displays, totalizers and controllers listed on page 657.



05618-10

**Specifications**



**Flow velocity:** 0.3 to 20 ft/sec (0.1 to 6 m/sec)

**Output:** open collector, sinking

**Linearity:** ±1% full-scale

**Repeatability:** ±0.5% full-scale

**Max temp:** 185°F (85°C) at 25 psi

**Max pressure (at 68°F/20°C)**

PP body: 180 psi (12.4 bar)

PVDF body: 200 psi (13.8 bar)

**Input power:** 3.3 to 24 VDC (supplied by a flow monitor/controller)



Catalog number	Pipe ID	Sensor length	Price
<b>Sensors with polypropylene body; titanium shaft</b>			
TW-32500-00	½" to 4"	4½"	
TW-32500-02	5" to 8"	5¾"	
<b>Sensors with PVDF body; Hastelloy C® shaft</b>			
TW-32500-10	½" to 4"	4½"	

**Specifications**



**Flow velocity:** 1 to 20 ft/sec (0.3 to 6 m/sec)

**Output:** 1 V peak-to-peak per ft/sec; 8 kΩ source impedance, nominal frequency of 6 Hz per ft/sec

**Linearity:** ±1% full-scale

**Repeatability:** ±0.5% full-scale

**Max temp**

PP body: 194°F (90°C)

PVDF body: 212°F (100°C)

**Max pressure (at 68°F/20°C)**

PP body: 180 psi (12.4 bar)

PVDF body: 200 psi (13.8 bar)



Catalog number	Pipe ID	Sensor length	Price
<b>Sensors with polypropylene body; titanium shaft</b>			
TW-05618-10	½" to 4"	4½"	
TW-05618-11	5" to 8"	5¾"	
<b>Sensors with PVDF body; Hastelloy C® shaft</b>			
TW-05618-13	½" to 4"	4½"	

**Metalex™ Sensors**

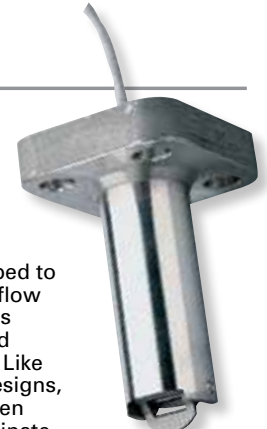
**Stainless steel body withstands high pressures and temperatures**

This design was specifically developed to handle aggressive flow applications such as liquid ammonia and steam condensate. Like all +GF+® Signet designs, the rotor has an open core design to eliminate cavitation, to reduce drag on the paddle and to minimize pressure drop within the system.

The design is suitable for measuring flow from 1.6 to 20 feet/second. Without amplification, the output signal can be transmitted up to 200 feet. As an FM-Approved device, this sensor may be installed in hazardous locations.

The sensor body is 316 SS. Other components are a CD4MCu SS rotor, Fluoroloy B® rotor bearing and KLINGER®sil O-ring. An integrated 25-foot signal cable is included for wiring the sensor into most systems.

These sensors may be mounted in any pipe that is compatible with the Metalex-specific installation fittings on the following page. Metalex sensors are compatible with all of the line-powered displays, totalizers and controllers listed on page 657.



05618-64

**Specifications**



**Flow velocity:** 1.6 to 20 ft/sec (0.5 to 6 m/sec)

**Output:** sine wave, 12k Ω source impedance; nominal frequency of 12 Hz per ft/second

**Linearity:** ±1% full-scale

**Repeatability:** ±0.5% full-scale

**Max temp**

Mini-tap fitting: 300°F (149°C)

Saddle fitting: 150°F (66°C)

**Max pressure**

Mini-tap fitting: 1500 psi (103 bar)

Saddle fitting: 300 psi (20.7 bar)



Catalog number	Pipe ID	Sensor length	Price
<b>Use with mini-tap fitting</b>			
TW-05618-60	½" to 1"	1½"	
TW-05618-64	1¼" to 12"	2½"	
<b>Use with saddle fitting</b>			
TW-05618-80	2" to 12"	4½"	

**MORE info!**

Mounting is critical to flow measurement accuracy. The fitting places the sensor at the proper height in the flow stream to achieve the maximum accuracy. To ensure proper paddle-wheel alignment, order an installation fitting from the next page.





# Flowmeters Paddle Wheel

## Installation Fittings

Fittings are precision crafted to ensure proper sensor insertion depth and accurate flow measurement. Pipe fitting sizes range from 1/2" to 12" in diameter. See our chemical resistance charts (go to [www.coleparmer.com/techinfo](http://www.coleparmer.com/techinfo)) to select a fitting material compatible with your fluid. Order dummy plugs (key letter **J**) to use in pipelines while sensors are removed.

- A** **PVDF Tees** with true union socket connectors. For pipes up to 2" in diameter.
- B** **Polypropylene Tees** for pipes up to 2" in diameter. True union socket connectors.
- C** **PVC Tees** for PVC 80 pipes up to 4" in diameter and CPVC 80 pipes up to 1 1/2" in diameter. Slip on ends (no threads).
- D** **Metal Tees** for copper, 316 stainless steel (SS), carbon steel (CS), and galvanized iron (schedule 40) pipes up to 2" in diameter. SS, CS, and galvanized iron fittings include PVDF insert for all sizes and NPT(F) threads at each end. Copper tee fittings include PVDF insert for pipe ID over 1" and feature sweat-on ends.
- E** **316 SS Socket-Weld Mini-Tap Fittings** for Metalex™ sensors only. Includes cap kit.

- F** **316 SS Weld-On Mini-Tap Fittings** for Metalex sensors only. Include a cap kit.
- G** **PVC Saddles** for PVC 40 pipes from 2" to 4" in diameter; PVC 80 pipes from 6" to 8" in diameter. Specify schedule of pipe when ordering.
- H** **Galvanized Iron (Schedule 80) Saddles** for pipes from 2 1/2" to 4" in diameter. Specify schedule of pipe when ordering.
- I** **Weldolet Fittings** weld directly onto hole cut in pipe. For stainless steel and carbon steel pipes 2 1/2" to 12" in diameter. Specify schedule of pipe when ordering.
- J** **Dummy Plug**. Insert a plug in place of the sensor when it has been removed for inspection or service. **Note:** Not for use with Metalex sensors.

**TW-05614-29** Polypropylene dummy plug

## REQUIRED SYSTEM Components

- 1** Flow sensor . . . . .647
- 2** Installation fitting. . . . .648
- 3** Monitor or controller. . . . .657

Fitting type	Pipe ID	Material	Catalog number	Price
<b>A</b>	1/2"	PVDF	<a href="#">TW-05619-51</a>	
<b>B</b>		Polypropylene	<a href="#">TW-05619-61</a>	
<b>C</b>		PVC 80	<a href="#">TW-05620-21</a>	
<b>D</b>		CPVC 80	<a href="#">TW-05620-31</a>	
<b>D</b>		316 SS	<a href="#">TW-05620-41</a>	
<b>D</b>		Copper	<a href="#">TW-05620-71</a>	
<b>E</b>		316 SS socket-weld	<a href="#">TW-05618-61</a>	
<b>A</b>	3/4"	PVDF	<a href="#">TW-05619-52</a>	
<b>B</b>		Polypropylene	<a href="#">TW-05619-62</a>	
<b>C</b>		PVC 80	<a href="#">TW-05620-22</a>	
<b>D</b>		CPVC 80	<a href="#">TW-05620-32</a>	
<b>D</b>		316 SS	<a href="#">TW-05620-42</a>	
<b>D</b>		Copper	<a href="#">TW-05620-72</a>	
<b>E</b>		316 SS socket-weld	<a href="#">TW-05618-62</a>	
<b>C</b>	1"	PVC 80	<a href="#">TW-05620-23</a>	
<b>D</b>		CPVC 80	<a href="#">TW-05620-33</a>	
<b>D</b>		Galvanized iron (40)	<a href="#">TW-05620-53</a>	
<b>D</b>		316 SS	<a href="#">TW-05620-43</a>	
<b>D</b>		Copper	<a href="#">TW-05620-73</a>	
<b>E</b>		316 SS socket-weld	<a href="#">TW-05618-63</a>	
<b>A</b>	1 1/4"	PVDF	<a href="#">TW-05619-53</a>	
<b>A</b>		PVDF	<a href="#">TW-05619-54</a>	
<b>B</b>		Polypropylene	<a href="#">TW-05619-64</a>	
<b>C</b>		PVC 80	<a href="#">TW-05620-24</a>	
<b>D</b>		CPVC 80	<a href="#">TW-05620-34</a>	
<b>D</b>		Galvanized iron (40)	<a href="#">TW-05620-54</a>	
<b>D</b>		316 SS	<a href="#">TW-05620-44</a>	
<b>D</b>		Copper	<a href="#">TW-05620-74</a>	
<b>R</b>		316 SS weld-on	<a href="#">TW-05618-65</a>	
<b>A</b>	1 1/2"	PVDF	<a href="#">TW-05619-55</a>	
<b>B</b>		Polypropylene	<a href="#">TW-05619-65</a>	
<b>C</b>		PVC 80	<a href="#">TW-05620-25</a>	
<b>C</b>		CPVC 80	<a href="#">TW-05620-35</a>	
<b>D</b>		Galvanized iron (40)	<a href="#">TW-05620-55</a>	
<b>D</b>		316 SS	<a href="#">TW-05620-45</a>	
<b>D</b>		Copper	<a href="#">TW-05620-75</a>	
<b>F</b>		316 SS weld-on	<a href="#">TW-05618-66</a>	

\*Fittings are metric size with a 32 mm (1.2598") pipe ID, not 1 1/4".



**A**



**B**



**C**



**D**

Fitting type	Pipe ID	Material	Catalog number	Price
<b>A</b>	2"	PVDF	<a href="#">TW-05619-56</a>	
<b>B</b>		Polypropylene	<a href="#">TW-05619-66</a>	
<b>C</b>		PVC 80	<a href="#">TW-05620-26</a>	
<b>D</b>		Galvanized iron (40)	<a href="#">TW-05620-56</a>	
<b>D</b>		316 SS	<a href="#">TW-05620-46</a>	
<b>D</b>		Copper	<a href="#">TW-05620-76</a>	
<b>G</b>		PVC 40	<a href="#">TW-05620-16</a>	
<b>F</b>		316 SS weld-on	<a href="#">TW-05618-70</a>	
<b>C</b>	2 1/2"	PVC 80	<a href="#">TW-05620-27</a>	
<b>G</b>		PVC 40	<a href="#">TW-05620-17</a>	
<b>H</b>	3"	Galvanized iron (80)	<a href="#">TW-05620-57</a>	
<b>C</b>		PVC 80	<a href="#">TW-05620-28</a>	
<b>G</b>		PVC 40	<a href="#">TW-05620-18</a>	
<b>H</b>	4"	Galvanized iron (80)	<a href="#">TW-05620-58</a>	
<b>I</b>		Carbon steel	<a href="#">TW-05615-23</a>	
<b>I</b>		316 SS	<a href="#">TW-05620-48</a>	
<b>F</b>		316 SS weld-on	<a href="#">TW-05618-72</a>	
<b>C</b>		PVC 80	<a href="#">TW-05620-29</a>	
<b>G</b>		PVC 40	<a href="#">TW-05620-19</a>	
<b>H</b>	6"	Galvanized iron (80)	<a href="#">TW-05620-59</a>	
<b>I</b>		Carbon steel	<a href="#">TW-05615-24</a>	
<b>F</b>		316 SS weld-on	<a href="#">TW-05618-73</a>	
<b>G</b>	8"	PVC 80	<a href="#">TW-05620-83</a>	
<b>I</b>		Carbon steel	<a href="#">TW-05615-26</a>	
<b>F</b>	10"	316 SS weld-on	<a href="#">TW-05618-75</a>	
<b>G</b>		PVC 80	<a href="#">TW-05620-84</a>	
<b>I</b>	12"	Carbon steel	<a href="#">TW-05615-27</a>	
<b>I</b>		Carbon steel	<a href="#">TW-05615-28</a>	
<b>I</b>		Carbon steel	<a href="#">TW-05615-29</a>	



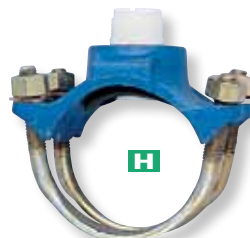
**E**



**F**



**G**



**H**



**I**



**J**



## Low-Flow Impeller Sensors and Controllers

### Impeller design minimizes wear for long sensor life

Each flow sensor uses a rotating turbine and a magnetic Hall-effect sensor to generate an electronic pulse proportional to flow rate. The controller converts these pulses into flow units. These low-flow sensors measure flow rates in pipe sizes from 3/8" to 1" NPT(F). Sensors generate a square wave pulse output that can be sent to flow controllers 33110-60 or -70 to display flow rate and total; batch controller 33112-52, which provides batch output control to multiple devices; or rate/total display 33112-50, which is a battery-operated two-line display.

Choose from polypropylene (PP), TFE, 316 stainless steel (SS), or brass sensors. Select PP sensors for general-purpose applications. Use TFE sensors for high-purity, high-temperature applications. The 316 SS sensors should be used in applications such as chemical batching and injection, fertilizer injection, or proportioning of spray chemicals. Brass sensor should be used in applications using clean water. For best results, install sensors within a straight run of tubing or pipe (five pipe diameters long on the inlet side). Sensors can be mounted in any orientation. All models include an 18-ft (5.5-m) L cable with stripped ends.



33125-10

### Specifications

<b>Viscosity range:</b> 30 cp max	<b>Max pressure</b>	<b>Output signal</b>
<b>Accuracy:</b> ±1% full-scale	PP and TFE: 150 psi (10.3 bar)	PP, TFE, and SS: current
<b>Linearity:</b> ±1% full-scale	SS: 500 psi (34.5 bar)	sinking pulse,
<b>Repeatability:</b> ±0.5% full-scale	Brass: 175 psi (12 bar)	6 to 24 VDC
<b>Max operating temperature</b>	<b>Input power</b>	Brass: square wave pulse,
PP and TFE: 160°F (71°C)	PP, TFE, and SS:	5 to 30 VDC
SS: 200°F (93°C)	5 to 24 VDC, 2 mA min	<b>Cable length:</b> 18 ft
Brass: 185°F (85°C)	Brass: 5 to 30 VDC current	
	sinking pulse	



Wetted materials	PP	TFE	316 SS	Brass
Body	PP	TFE	316 SS	Nickel-plated brass
Rotor	PVDF	PVDF	PVDF	Thermoplastic
Shaft	Tungsten carbide	Ceramic	Tungsten carbide	Tungsten carbide
Bearings	Ruby	Ruby	Ruby	Sapphire, graphic
O-ring	EPDM	Viton®	Viton	Viton
Cover	Acrylic	TFE	316 SS	Thermoplastic

Flow range (GPM)	Connection NPT(F)	Pressure drop at max flow	PP sensors		TFE sensors		SS sensors		Brass sensors	
			Cat. no.	Price	Cat. no.	Price	Cat. no.	Price	Cat. no.	Price
0.07 to 5	3/8"	15 psi	<a href="#">TW-33110-00</a>	—	<a href="#">TW-33110-05</a>	—	—	—	—	—
0.1 to 10	1/2"	15 psi	<a href="#">TW-33110-10</a>	—	<a href="#">TW-33110-15</a>	—	<a href="#">TW-33125-10</a>	—	—	—
0.2 to 10	1/2"	14 psi	—	—	—	—	—	—	<a href="#">TW-33125-00</a>	—
0.2 to 15	3/4"	14 psi	—	—	—	—	<a href="#">TW-33125-15</a>	—	—	—
0.2 to 18	3/4"	14 psi	—	—	—	—	—	—	<a href="#">TW-33125-05</a>	—
0.2 to 20	3/4"	24 psi	<a href="#">TW-33110-20</a>	—	<a href="#">TW-33110-25</a>	—	—	—	—	—
0.5 to 25	1"	15 psi	—	—	—	—	<a href="#">TW-33125-20</a>	—	—	—
0.5 to 40	1"	24 psi	<a href="#">TW-33110-30</a>	—	<a href="#">TW-33110-35</a>	—	—	—	—	—

### Flow Rate/Totalizer Display

Battery-operated flow rate/totalizer display has a three to five year battery life. The two-line LCD provides 6-digit rate and 8-digit total display simultaneously—units are user-selectable. Flow display has simple, three-button operation: enter the R-factor, pulse output scaling, and the decimal point. Includes a wall-mountable NEMA 4X enclosure.



33112-50

### Specifications



<b>Sensor input:</b> square wave, 20 mV to 6 V peak to peak
<b>Output:</b> 0.1 second open collector pulse, scalable 0.1 to 200,000 units/pulse
<b>Operating temperature:</b> 32 to 158°F (0 to 70°C)
<b>Power:</b> lithium C cell battery, 3 V
<b>Dimensions (W x H x D):</b> 3 3/8" x 3 3/8" x 2 1/8" (9.8 x 9.8 x 7.3 cm)

Cat. no.	Description	Price
<a href="#">TW-33112-50</a>	Flow rate/totalizer display	

### Batch Controller

Controller provides batch output control through two relays for controlling multiple devices. Dual pulse outputs allow proportional feed with pulse-responsive metering pumps. Features backlit 5-digit flow rate and 8-digit totalizer displays—volume and time units are user-selectable. NEMA 4X enclosure can be wall or panel mounted.



### Specifications

<b>Sensor input:</b> open collector current sink; 1000 Hz max
<b>Output power, sensor:</b> 12 VDC, 10 mA
<b>Relay output:</b> two SPDT relay, 115 VAC, 5 A max, NO or NC
<b>Pulse output:</b> two, 100 mA at 60 VDC, max
<b>Analog output:</b> 4 to 20 mA, 0 to 10 VDC, or 0 to 5 VDC
<b>Operating temperature:</b> 32 to 130°F (0 to 55°C)
<b>Input power:</b> 115/220 VAC, 50/60 Hz or 12 to 24 VDC
<b>Auxiliary input:</b> batch start/stop/resume
<b>Dimensions (W x H x D):</b> 6 1/16" x 6 7/16" x 4 7/8" (16.3 x 16.3 x 11.8 cm)

Cat. no.	Description	Price
<a href="#">TW-33112-52</a>	Batch controller	

### Flow Controllers

Controllers display flow rate and total (resettable) simultaneously on a two-line 8-digit LCD. The 4 to 20 mA output lets you send data to a recorder or data logger. Nonvolatile memory stores flow total in the event of power failure.

Panel-mount model 33110-60 features a gasketed front panel, membrane switches, and NEMA 12 (IP52) enclosure. Wall-mount model 33110-70 has a clear cover and splashproof NEMA 4X (IP56) enclosure. Both models include a 2 1/2-ft (0.8-m) L cable with stripped ends.

### Specifications



<b>Input signal:</b> pulse frequency 5 VDC 200 Hz max
<b>Output signal:</b> 4 to 20 mA (loop) scaled pulse, open collector; sensor pulse pass through high/low alarm (through pulse output)
<b>Operating temperature:</b> 32 to 158°F (0 to 80°C)
<b>Input power:</b> 12 or 32 VDC, 4 mA loop powered
<b>Display type:</b> two-line, 8-digit LCD, 7/16"H
<b>Panel cutout:</b> 3 1/16"W x 3 3/16"H x 2"D
<b>Dimensions (W x H x D)</b>
Panel-mount model: 3 3/4" x 3 3/4" x 2" (9.5 x 9.5 x 5.1 cm)
Wall-mount model: 3 7/8" x 3 7/8" x 2 1/8" (9.8 x 9.8 x 7.3 cm)

Cat. no.	Description	Price
<a href="#">TW-33110-60</a>	Panel mount	
<a href="#">TW-33110-70</a>	Wall mount	



# Flowmeters Paddle Wheel

## Cole-Parmer® Battery-Powered In-Line Flowmeters

### Battery-powered meters are perfect for remote locations

- Polypropylene (PP) in-line fittings feature NPT(F) true-union connections for simple installation on existing pipe
- Factory-calibrated for GPM or LPM
- Corrosion-resistant polyvinylidene fluoride (PVDF) sensor features a NEMA 4X enclosure acceptable for outdoor use
- Simple operation with nothing to program
- Accurate measurement with virtually zero pressure drop



Flowmeter with totalizer 32555-50

### Specifications



- Fluid type:** water-like, less than 1% solids  
**Accuracy:** ±2% full scale  
**Operating temperature:** 200°F (93°C) max  
**Operating pressure:** 300 psi (20.7 bar)  
**Wetted materials:** polypropylene, PVDF, Hastelloy-C, Viton®  
**Power:** two AAA batteries (included)  
**Battery life:** one year minimum  
**Enclosure rating:** NEMA 4X  
**Display type:** 6-digit LCD, 3/8"H  
**Display update:** 1.5 seconds  
**Dimensions (W x H x D):** 3" x 5" x 2" (7.6 x 12.7 x 5.1 cm)

Connections NPT(F)	English scale			Metric scale		
	Flow range (GPM)	Catalog number	Price	Flow range (LPM)	Catalog number	Price
<b>Flowmeters</b>						
3/8"	0.4 to 4	<a href="#">TW-32555-00</a>		1 to 10	<a href="#">TW-32555-02</a>	
3/8"	0.8 to 8	<a href="#">TW-32555-04</a>		3 to 30	<a href="#">TW-32555-06</a>	
1/2"	2 to 20	<a href="#">TW-32555-08</a>		7 to 70	<a href="#">TW-32555-10</a>	
3/4"	4 to 40	<a href="#">TW-32555-12</a>		15 to 150	<a href="#">TW-32555-14</a>	
1"	6 to 60	<a href="#">TW-32555-16</a>		25 to 250	<a href="#">TW-32555-18</a>	
1 1/2"	10 to 100	<a href="#">TW-32555-20</a>		40 to 400	<a href="#">TW-32555-22</a>	
1 1/2"	15 to 150	<a href="#">TW-32555-24</a>		60 to 600	<a href="#">TW-32555-26</a>	
2"	30 to 300	<a href="#">TW-32555-28</a>		100 to 1000	<a href="#">TW-32555-30</a>	
<b>Flowmeters with totalizers</b>						
3/8"	0.4 to 4	<a href="#">TW-32555-50</a>		1 to 10	<a href="#">TW-32555-52</a>	
3/8"	0.8 to 8	<a href="#">TW-32555-54</a>		3 to 30	<a href="#">TW-32555-56</a>	
1/2"	2 to 20	<a href="#">TW-32555-58</a>		7 to 70	<a href="#">TW-32555-60</a>	
3/4"	4 to 40	<a href="#">TW-32555-62</a>		15 to 150	<a href="#">TW-32555-64</a>	
1"	6 to 60	<a href="#">TW-32555-66</a>		25 to 250	<a href="#">TW-32555-68</a>	
1 1/2"	10 to 100	<a href="#">TW-32555-70</a>		40 to 400	<a href="#">TW-32555-72</a>	
1 1/2"	15 to 150	<a href="#">TW-32555-74</a>		60 to 600	<a href="#">TW-32555-76</a>	
2"	30 to 300	<a href="#">TW-32555-78</a>		100 to 1000	<a href="#">TW-32555-80</a>	

[TW-09376-00](#) Replacement batteries; AAA. Pack of 12  
[TW-17080-12](#) NIST-traceable calibration with data

## Cole-Parmer® Economical In-Line Flowmeters

### Accurate measurement with virtually zero pressure drop

- Simple operation with nothing to program
- Factory-calibrated for GPM or LPM



Flowmeter with totalizer 32556-24

These injection-molded in-line flowmeters are battery powered (two AAA batteries included) making them perfect for remote locations. Enclosure is rated NEMA 4X and can be used in outdoor locations. Sensor is constructed of corrosion-resistant PVDF; in-line NPT(M) fittings are of PP.

### Specifications



- Fluid type:** water-like, less than 1% solids  
**Accuracy:** ±1% full-scale  
**Operating temperature:** 200°F (93°C) max  
**Operating pressure:** 300 psi (20.7 bar)  
**Wetted materials:** PP, PVDF, Viton®  
**Power:** two AAA batteries (included)  
**Battery life:** one year minimum  
**Enclosure rating:** NEMA 4X  
**Display type:** 6-digit LCD, 3/8"H  
**Display update:** 1.5 seconds (10 second average)  
**Dimensions (W x H x D):** 3" x 5" x 2" (7.6 x 12.7 x 5.1 cm)

Connections NPT(M)	English scale			Metric scale		
	Flow range (GPM)	Catalog number	Price	Flow range (LPM)	Catalog number	Price
<b>Rate only flowmeters</b>						
3/8"	0.4 to 4	<a href="#">TW-32556-00</a>		1 to 10	<a href="#">TW-32556-32</a>	
3/8"	0.8 to 8	<a href="#">TW-32556-02</a>		3 to 30	<a href="#">TW-32556-34</a>	
1/2"	2 to 20	<a href="#">TW-32556-04</a>		7 to 70	<a href="#">TW-32556-36</a>	
3/4"	3 to 30	<a href="#">TW-32556-06</a>		11 to 110	<a href="#">TW-32556-38</a>	
1"	6 to 60	<a href="#">TW-32556-08</a>		25 to 250	<a href="#">TW-32556-40</a>	
1 1/2"	10 to 100	<a href="#">TW-32556-10</a>		40 to 400	<a href="#">TW-32556-42</a>	
1 1/2"	15 to 150	<a href="#">TW-32556-12</a>		60 to 600	<a href="#">TW-32556-44</a>	
2"	30 to 300	<a href="#">TW-32556-14</a>		100 to 1000	<a href="#">TW-32556-46</a>	
<b>Rate and totalizer flowmeters</b>						
3/8"	0.4 to 4	<a href="#">TW-32556-16</a>		1 to 10	<a href="#">TW-32556-48</a>	
3/8"	0.8 to 8	<a href="#">TW-32556-18</a>		3 to 30	<a href="#">TW-32556-50</a>	
1/2"	2 to 20	<a href="#">TW-32556-20</a>		7 to 70	<a href="#">TW-32556-52</a>	
3/4"	3 to 30	<a href="#">TW-32556-22</a>		11 to 110	<a href="#">TW-32556-54</a>	
1"	6 to 60	<a href="#">TW-32556-24</a>		25 to 250	<a href="#">TW-32556-56</a>	
1 1/2"	10 to 100	<a href="#">TW-32556-26</a>		40 to 400	<a href="#">TW-32556-58</a>	
1 1/2"	15 to 150	<a href="#">TW-32556-28</a>		60 to 600	<a href="#">TW-32556-60</a>	
2"	30 to 300	<a href="#">TW-32556-30</a>		100 to 1000	<a href="#">TW-32556-62</a>	

[TW-09376-00](#) Replacement batteries; AAA. Pack of 12  
[TW-17080-12](#) NIST-traceable calibration with data



**Cole-Parmer® Micro-Flo Rate and Total Meters**

**Economical low-flow ranges**

- Displays flow rate and total
- Preset factory calibrations or custom field-calibrated

These economical meters are capable of very low flow rates. The display is programmable for preselected factory settings or can be field calibrated for high accuracy in a specific application. Displays units in milliliters, ounces, liters, or gallons; displays time in minutes, hours, or days. Display can be programmed for up to four decimal places. All units are supplied with a 115 VAC/DC power supply.



32550-01

**Specifications**

- Accuracy:** ±6% full-scale  
**Maximum fluid temperature:** 130°F (54°C)  
**Maximum working pressure:** 200 psi (13.8 bar)  
**Materials of construction:**  
 PVDF body, paddle, axle, tubing connections;  
 PVC NPT connections and lens; Viton® O-rings  
**Power:** 115 VAC/DC plug-in transformer



Flow range (mL/min)	¼" NPT(F) pipe connection		¼" ID x ¾" OD tubing connection	
	Catalog number	Price	Catalog number	Price
30 to 300	<a href="#">TW-32550-01</a>		<a href="#">TW-32550-13</a>	
100 to 1000	<a href="#">TW-32550-03</a>		<a href="#">TW-32550-15</a>	
200 to 2000	<a href="#">TW-32550-05</a>		<a href="#">TW-32550-17</a>	
300 to 3000	<a href="#">TW-32550-07</a>		<a href="#">TW-32550-19</a>	
500 to 5000	<a href="#">TW-32550-09</a>		<a href="#">TW-32550-21</a>	
700 to 7000	<a href="#">TW-32550-11</a>		<a href="#">TW-32550-23</a>	

**Turbo-Prop Open-Channel Flowmeters**

**Accurately measure water velocity in open channels and partially filled pipes**

- Digital display in ft/sec or m/sec
- Records 30 data sets for later analysis
- Lightweight, rugged, and reliable

Water velocity flowmeter consists of a protected water turbo-prop positive displacement sensor coupled with an expandable probe handle ending in a digital readout display. Meter incorporates true velocity averaging for the most accurate flow measurements. Magnetic material in the propeller tip passes a pickup point in the water velocity meter handle producing electrical impulses that are carried to the readout display by an internal cable. The flowmeter propeller rotates freely on its bearing shaft with no mechanical interconnections for minimal friction.

The turbo-prop is easily removed for cleaning or replacement. The sensor is designed to shed debris and is protected inside a 2" diameter housing. Probe housing may be placed directly on the bottom of a pipe or streambed for measuring flow in depths as low as 2".

Large LCD displays average, minimum, and maximum water velocity readings. Up to 30 sets of time-and-date stamped data points can be stored in the computer with the push of a button. The computer has a water-resistant housing and incorporates a unique four-button operation for changing functions and resetting the display. Computer is powered by a non-replaceable battery that will last approximately five years with normal use. Low battery and end of data warnings will also display.

A 3-foot Mylar®-coated staff gauge (graduated in hundredths of a foot and centimeters) is attached to the lower section of the water velocity probe for instant water depth measurements and accurate propeller positioning. Meter is ideal for measuring flows in streams, rivers, canals, stormwater, wastewater, inflow and infiltration studies, and industrial process waters.

**What's included:** padded carrying case.



**Specifications**

- Fluid type:** water  
**Accuracy:** ±0.1 ft/sec  
**Flow range:** 0.3 to 19.9 ft/sec  
**Operating temperature:** -4 to 158°F (-20 to 70°C)  
**Display:** 3-digit LCD, 0.5"H

- Material of construction**  
 Probe: PVC and anodized aluminum with SS water bearing  
 Computer: ABS/PC housing with polyester overlay  
**Power:** lithium battery (nonreplaceable)  
**Battery life:** approx 5 years



Flowmeter display



Flowmeter turbine

Catalog number	Handle length	Price
<a href="#">TW-32922-01</a>	3 to 6 ft (0.9 to 1.8 m)	
<a href="#">TW-32922-02</a>	5 to 15 ft (1.5 to 4.5 m)	

[TW-17080-12](#) NIST-traceable calibration



# Flowmeters

## Gear

### Aluminum/Stainless Steel Gear Flow Sensors/Transmitters

#### Flowmeters with ±0.5% accuracy for flow rates up to 60 GPM (227.12 LPM)

- High-strength aluminum or stainless steel body withstands pressures up to 5000 psi
- Choose models with pulse output, 4 to 20 mA signal output, or integral digital display

Precisely measured gear teeth deliver consistent ±0.5% accuracy even when measuring high-viscosity fluids—ideal for measuring the flow of oils, grease, fuels, solvents, and other nonabrasive lubricating liquids. These positive displacement flowmeters are solidly built to provide excellent dynamic response for use in high-pressure applications. Gears and bearings withstand bidirectional flow without damage. Two 6-mm mounting holes let you secure the meter on a base plate, panel, or manifold. Available with a high-strength aluminum or 303 SS body.

**A Flowmeters with Pulse Output** provide a NPN sourcing square wave pulse that is proportional to the flow rate. The peak-to-peak voltage of this square wave is the supply voltage provided minus two volts.

**B Flowmeters with Analog Output** provide a scalable 4 to 20 mA signal output proportional to the flow rate.

**C Flowmeters with Meter-Mounted Display** instantaneous flow rate or total readings on a large 6-digit LCD. Display is fully programmable and allows you to switch between rate and flow total as well as reset totalization by using an attached magnet sensor—no need to open up the weather-tight enclosure. Portable and battery-operated, includes a battery pack that lasts up to four years.

**Note:** These flowmeters are not recommended for water, for fluids with abrasives such as paint and sealants, or for strong acids and bases. Please read maximum particle size in the specifications list below.



Cut away view of 32928-12



**A**  
Flowmeter with pulse output  
32928-10



**B**  
Meter-mounted analog flowmeter  
32928-20



**C**  
Meter-mounted digital flowmeter with integral display  
32928-38



### Specifications



**Viscosity range:** 1 to 100,000 cp

**Accuracy:** ±0.5% of reading

**Repeatability:** ±0.1% of reading

**Maximum temp**

Aluminum body: 185°F (85°C)

Stainless steel body: 400°F (205°C)

**Output signals**

Pulse models: square wave, 10 to 24 VDC

Other models: 4 to 20 mA

**Maximum pressure:** 5000 psi (345 bar)

**Materials:** 17-4 PH SS gears, 440 SS bearings, PTFE O-rings, aluminum or 303 SS body

**Maximum particle size**

0.003 to 0.5 GPM models: 30 µm

0.01 to 2 GPM models: 30 µm

0.05 to 20 GPM models: 30 µm

0.5 to 60 GPM models: 120 µm

**Power requirements:** 10 to 24 VDC at 25 mA

**Flowmeter dimensions (H x dia)**

0.003 to 0.5 GPM models: 1½" x 2" (3.8 x 5.1 cm)

0.01 to 2 GPM models: 2¼" x 2½" (5.7 x 6.4 cm)

0.05 to 20 GPM models: 4½" x 3" (11.4 x 7.6 cm)

0.5 to 60 GPM models: 5½" x 7⅞" (14.0 x 20.0 cm)

Flow rates (GPM)	Pressure drop (max flow)	Connections NPT(F)	Aluminum body		303 SS body	
			Catalog number	Price	Catalog number	Price
<b>A Flowmeters with pulse output</b>						
0.003 to 0.5	45 psi at 100 cSt	¼"	TW-32928-01	—	—	—
0.01 to 2	10 psi at 100 cSt	¼"	TW-32928-00	—	TW-32928-10	—
0.05 to 20	45 psi at 100 cSt	½"	TW-32928-02	—	TW-32928-12	—
<b>B Meter-mounted analog flowmeters with 4 to 20 mA output</b>						
0.01 to 2	10 psi at 100 cSt	¼"	TW-32928-20	—	TW-32928-26	—
0.05 to 20	45 psi at 100 cSt	½"	TW-32928-22	—	TW-32928-28	—
<b>C Meter-mounted digital flowmeters with integral display</b>						
0.01 to 2	10 psi at 100 cSt	¼"	TW-32928-30	—	TW-32928-36	—
0.05 to 20	45 psi at 100 cSt	½"	TW-32928-32	—	TW-32928-38	—
0.5 to 60	40 psi at 100 cSt	1¼"	TW-32928-34	—	TW-32928-40	—

### Flow Monitors and Accessories

Monitor both flow rate and total flow from pulse output flowmeters in any engineering unit with a push of a button. Programmable, compact, and easy-to-use. Input square wave, sine, or sawtooth frequency. Back-up totalizer lock-out feature prevents accidental erasure. High-speed microprocessor ensures fast and accurate reporting—includes a 4 to 20-mA output for recording or data logging.

**Flow monitor (32928-75 and -76) for pulse output flowmeters 32928-01 to -12**



**TW-32928-75 Flow monitor**, 110 VAC; face panel measures (W x H x D) 7" x 3" x 5" (17.8 x 7.6 x 12.7 cm)

**TW-32928-76 Flow monitor**, 110 VAC; 4 to 20 mA output; face panel measures (W x H x D) 7" x 3" x 5" (17.8 x 7.6 x 12.7 cm)

**TW-32928-60 Cable**, 10-ft (3.0-m) connection for flow monitor 32928-75 and -76

**TW-50001-00 Line cord**; 120 VAC, 6-ft (1.8-m) L US standard plug, for use with flow monitors 32928-75 and -76



## Clamp-On Transit-Time Ultrasonic Flowmeters

No need to shut down the process for installation or maintenance due to clamp-on sensor design

- Large, easy-to-read digital display
- 4 to 20 mA output
- RS-485 Modbus network connection

**NEW**

Transit-time ultrasonic flowmeters clamp onto the outside of pipes and do not contact the internal liquid. The technology has inherent advantages over alternate devices including low-cost installation, no pressure head loss, no moving parts to maintain or replace, no fluid compatibility issue, and a large bidirectional measuring range that ensures reliable readings even at very low and high flow rates. Flowmeters feature a rate and total function, which includes forward, reverse, and net total, and remote totalizer reset. Use meters to measure clean liquids as well as those with small amounts of suspended solids or aeration.

Flowmeters are available in a variety of configurations—select a meter with features suitable to meet your particular application requirements. Rugged, aluminum enclosure ensures a long service life in harsh environments. Flowmeters have a 0 to 1000 Hz rate pulse, dual alarm output, and USB programming port (software included).

Choose from two styles: meters with an integral flow transducer or meters with a remote flow transducer. Order flowmeters with an integral transducer for use on 1/2" to 2" ANSI or copper pipes. The flowmeters with remote transducer are ideal for pipes in hard-to-see locations or under severe vibration. Order flowmeter and transducer separately; remote transducers come with 20 ft (6 m) of cable but can be separated up to 990 ft (300 m) from the meter. Other flowmeter configurations are available—contact an Application Specialist for details.

**What's included:** programming software. Remote transducers also include 20-ft (6-m) cable.



32617-10



Flowmeter 32617-24 shown with transducer 32617-30.

### Specifications

#### General

**Fluid type:** most clean liquids or liquids containing small amounts of suspended solids or gas bubbles

**Range:** bidirectional to greater than 40 ft/sec (12 m/s)

**Accuracy:** ±1% of reading or ±0.01 ft/sec (0.003 m/s), whichever is greater

**Software:** use to configure, calibrate, and troubleshoot flowmeters. Connection via USB A/B cable; compatible with Windows® 2000, Windows XP, Windows Vista® and Windows 7

#### Meter

**Enclosure:** IP65-rated construction; powder-coated aluminum, polycarbonate, stainless steel, polyurethane, nickel-plated steel mounting brackets

**Display:** two-line LCD, LED backlight; top row 0.7" (18 mm) H, 7 segment; bottom row 0.35" (9 mm) H Units of measure: ft, cubic ft, m, cubic m, gallons, liters, million gallons, barrels (liquid and oil), acre-feet, lb, kg

**Operating temperature:** -40 to 185°F (-40 to 85°C)



**Power:** 96 to 264 VAC, 47 to 63 Hz at 17 VA max

**Dimensions (W x H x D):** 6" x 4 5/16" x 2 1/16" (15.2 x 11 x 5.2 cm)

#### Transducer

**Housing material:** IP67-rated construction; CPVC, Ultem®, nylon cord grip, PVC cable jacket

**Operating temperature:** -40 to 250°F (-40 to 121°C)

**Safety classification:** Class I Div. 1, Groups C and D T5 Intrinsically Safe Ex ia; CSA C22.2 Nos. 142 and 157; UL 913 and 916

### Meters with Integral Flow Transducer

Pipe size	For ANSI pipes				For copper pipes			
	Catalog number	Flow range		Price	Catalog number	Flow range		Price
		GPM	LPM			GPM	LPM	
1/2"	<a href="#">TW-32617-00</a>	2 to 38	8 to 144		<a href="#">TW-32617-12</a>	1.8 to 27	7 to 102	
3/4"	<a href="#">TW-32617-02</a>	2.75 to 66	10 to 250		<a href="#">TW-32617-14</a>	2.5 to 54	10 to 204	
1"	<a href="#">TW-32617-04</a>	3.5 to 108	13 to 409		<a href="#">TW-32617-16</a>	3.5 to 108	13 to 320	
1 1/4"	<a href="#">TW-32617-06</a>	5 to 186	19 to 704		<a href="#">TW-32617-18</a>	4.5 to 152	17 to 575	
1 1/2"	<a href="#">TW-32617-08</a>	6 to 250	23 to 946		<a href="#">TW-32617-20</a>	5 to 215	19 to 814	
2"	<a href="#">TW-32617-10</a>	8 to 420	30 to 1590		<a href="#">TW-32617-22</a>	8 to 375	30 to 1419	

### Remote Flow Transducers (meter 32617-24 required; order separately below)

Pipe size	For ANSI pipes				For copper pipes			
	Catalog number	Flow range		Price	Catalog number	Flow range		Price
		GPM	LPM			GPM	LPM	
1/2"	<a href="#">TW-32617-26</a>	2 to 38	8 to 144		<a href="#">TW-32617-38</a>	1.8 to 27	7 to 102	
3/4"	<a href="#">TW-32617-28</a>	2.75 to 66	10 to 250		<a href="#">TW-32617-40</a>	2.5 to 54	10 to 204	
1"	<a href="#">TW-32617-30</a>	3.5 to 108	13 to 409		<a href="#">TW-32617-42</a>	3.5 to 108	13 to 320	
1 1/4"	<a href="#">TW-32617-32</a>	5 to 186	19 to 704		<a href="#">TW-32617-44</a>	4.5 to 152	17 to 575	
1 1/2"	<a href="#">TW-32617-34</a>	6 to 250	23 to 946		<a href="#">TW-32617-46</a>	5 to 215	19 to 814	
2"	<a href="#">TW-32617-36</a>	8 to 420	30 to 1590		<a href="#">TW-32617-48</a>	8 to 375	30 to 1419	
2" and larger	<a href="#">TW-32617-50</a>	8 to 420	30 to 1590		<a href="#">TW-32617-50</a>	8 to 375	30 to 1419	

[TW-32617-24 Flowmeter](#). Required for remote transducers



**Flowmeters**  
**Ultrasonic**

**Cole-Parmer Handheld Doppler Flowmeter**

Portable and flexible for diagnosing flow profiles throughout a process

- Unit uses advanced signal processing to measure flow in pipe sized 1" to 60" (2.5 to 152.4 cm) in diameter

This noninvasive design is uniquely suited for measuring slurries and dirty fluids. The chemical industry, construction, mining, food processing, and sewage/water treatment plants use this technology extensively.

Install sensor on dense-material pipes (not typically transit/clay, concrete or fiberglass). View flow velocity in ft/sec or m/sec (switch selectable) on a large character 4-digit LCD; also displayed is signal strength and low-battery condition. The unit's power management capabilities extend battery life to 30 continuous hours.

**What's included:** case, sensor with 6-ft (1.8-m) cable, tube of transducer couplant, and four AA batteries.



32986-00

**Specifications**

**Liquid type:** fluids with particulates or bubbles; 100 ppm, 100 microns, or larger

**Range:** 0.30 to 30 ft/sec (0.1 to 9 m/sec)

**Accuracy:** ±2% full-scale

**Repeatability:** ±1% full-scale

**Operating temperature:** -28 to 140°F (-20 to 60°C)

**Display:** single-line 4-digit LCD

**Power:** four alkaline AA batteries (included)

**Dimensions (W x H x D):** 4" x 7<sup>3</sup>/<sub>4</sub>" x 1<sup>1</sup>/<sub>2</sub>" (10.2 x 19.7 x 3.8 cm)



Catalog number	Description	Price
<a href="#">TW-32986-00</a>	Handheld Doppler flowmeter	

[TW-09376-01](#) Replacement batteries, AA. Pack of four

**TECHNICAL info!**

Please refer to the intro pages of this section for details about how this technology works.

**Portable Doppler Ultrasonic Flowmeter**

Solid-state measurement reduces recalibration requirements

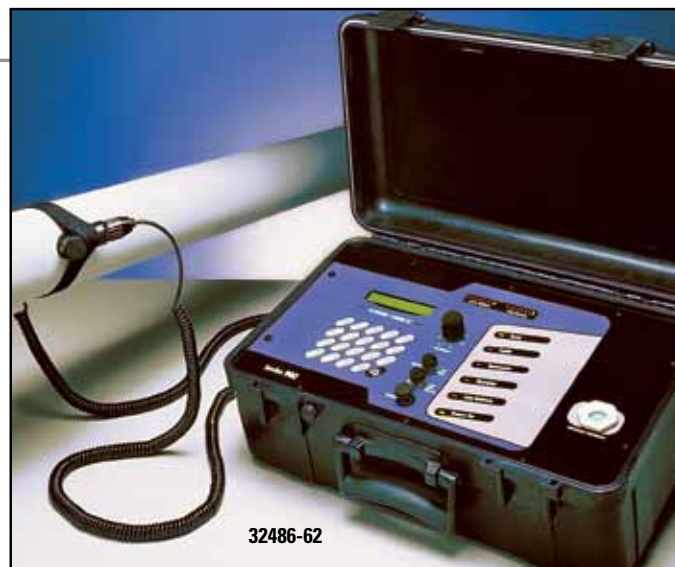
- Operates with relatively clean liquids as well as liquids with concentrations of suspended solids or aeration

This flowmeter's signal processing algorithm allows for use with fluids that are cleaner than most Doppler meters can handle. In addition, accuracy is improved with a microprocessor that automatically tracks frequency and linearizes the Doppler signal for turbulent or asymmetric flows.

The clamp-on, non-invasive transducers should be mounted to dense-material pipes (not typically transit/clay, concrete, or fiberglass) and work with pipe sizes from 1/4" to 20" (0.6 to 51 cm) in diameter. They are nonfouling to prevent permanent coating with grease, paraffin, and coupling materials.

Measure flow velocity in ft/sec or m/sec, and flow rate in GPM or MGD; a totalizer registering in gallons is also included. A 4 to 20 mA output signal is available for monitoring or recording flow data. The rechargeable battery lasts 8 hours, and nonvolatile memory saves parameters when the battery needs recharging. If planning to use this unit in a clean fluid application, place the sensors 1 to 3 pipe diameters downstream from a 90° elbow.

**What's included:** two transducers with 20-ft (6-m) cable for each, sensor mounting straps, transducer couplant, output cable, rechargeable battery with charger, and heavy-duty NEMA 4X carrying case.



32486-62

**Specifications**

**Liquid type:** liquids that are clean and liquids with higher concentrations of suspended solids or aeration

**Range:** 0.5 to 20 ft/sec (0.15 to 6 m/sec)

**Accuracy:** ±2% full-scale

**Repeatability:** ±0.4% full-scale

**Output:** 4 to 20 mA

**Operating temp:** -22 to 160°F (-30 to 70°C)

**Display:** 2-line x 20 character backlit LCD

**Power:** rechargeable cell battery (115/230 VAC charger included)

**Battery life:** 8 hours continuous operation

**Dimensions (L x W x H):** 17" x 11" x 8" (43.2 x 27.9 x 20.3 cm)



Catalog number	Description	Price
<a href="#">TW-32486-62</a>	Portable Doppler flowmeter	

**Technical Assistance?**

Contact our expert Application Specialists to assist you. Call 1-847-549-7600 or go online to e-mail or chat live.





**Cole-Parmer Doppler Ultrasonic Flowmeters**

**In-field linearization allows adaptation to a wide variety of applications**

- Clamp-on sensor eliminates the need for in-line flanges, pipe fittings, strainers, or filters

Use these Doppler flowmeters to measure the flow of liquids in pipes from ¼" and larger. The transducers send flow data via RG59 coax cable to the monitor, and the monitor's software automatically adjusts filtering parameters and gain settings to ensure reliable readings over a wide range of liquid and reflector conditions. Easily configure the monitor using the front panel keypad. A two-line backlit LCD displays rate and accumulated flow values in user selected measuring units.

**REQUIRED SYSTEM Components**

- 1 Flow transducer
- 2 Flow monitor



Flow monitor  
32615-60



**Specifications**

**General**

**Liquid type:** liquids containing 100 ppm of useful sonic suspended reflectors greater than 35 micron size, and at least 25% of the overall particle volume is larger than 100 microns

**Range:** 0.15 to 30 ft/sec

**Accuracy:** ±2% full-scale over calibrated span

**Transducers**

**Housing material:** NEMA 6P (IP68) CPVC, Ultem®, nylon, PVC (cable jacket), aluminum (small pipe only)

**Operating temperature:** -40 to 210°F (-40 to 99°C)

**Monitor**

**Enclosure:** IP66-rated polycarbonate and stainless steel

**Display:** 2-line, 8 character LCD with LED backlight; top row is 0.7"H, bottom row is 0.35"H

**Power:** 115 VAC 50/60 Hz

**Units of measure (volumetric):** user configured; feet, gallons, ft³, Millions-gallon, meters, liters, Millions ft³, m³, Millions-liters, acre-feet, oil barrels (42 gallon), liquor barrels (32.5 gallons), lb, kg

**Rate interval:** second, minute, hour, day

**Response time:** user-selectable 1 to 60 seconds

**Operating temperature:** -40 to 185°F (-40 to 85°C)

**2 Flow Monitors**

Input/output	Catalog number	Price
—	<a href="#">TW-32615-60</a>	
4 to 20 mA	<a href="#">TW-32615-62</a>	
Dual 4 to 20 mA	<a href="#">TW-32615-64</a>	

**1 Flow Transducers**

Pipe size	Catalog number	Price
¼" to 1"	<a href="#">TW-32615-68</a>	
1" and up	<a href="#">TW-32615-66</a>	

**LEVIFLOW™ Transit-Time Ultrasonic Flowmeters**

**Improved bubble robustness due to DSP technology**

- No contamination due to noninvasive measurement
- Choice of "Z" or "U" shaped flow patterns

These meters are designed for flow measurement in high-purity processes in the pharmaceutical and semiconductor industries. Flow is sensed by two piezoelectric transducers mounted at both ends of the measuring path of the fluid stream, generating and receiving an ultrasonic wave. The wave going in direction of the flow (with-stream wave) is accelerated and the wave going against (against-stream wave) the flow direction is slowed down. The two waves are processed by a signal converter. The difference of the transmit time of both waves is proportional to the velocity of the fluid.

The standard configuration of the LEVIFLOW flowmeter consists of a flowtube with two sensors, and a converter with digital signal processor (DSP) and 4-digit display. The single-channel flow converter is DIN-rail mountable and features an alarm and totalization. Various signals (analog, digital input, and digital output) are provided and can be configured with PC software. A two-wire RS-485 bus allows arrays of multiple flowmeters.

**What's included:** flowtube with two sensors and flow converter. Extension cable is required; order separately below.

**REQUIRED SYSTEM Components**

- 1 Flow meter
- 2 Extension cable



Flow signal converter



Z-shaped PFA flowtube  
32504-00



**Specifications**

**Accuracy (flow velocity >1 m/s):** ±1% of reading or better

**Operating temperature:** 32 to 140°F (0 to 60°C)

**Fluid temperature:** 50 to 320°F (10 to 160°C)

**Max pressure:** 72.5 psi

**Wetted materials:** PFA

**Cable jacket material:** FEP

**Display:** 4-digit LED

**Power:** 24 VDC

**Output:** MODBUS®, RS-485, and 4 to 20 mA

Flow range		Accuracy at stated range (LPM)		Connection	Z-shaped flow pattern	U-shaped flow pattern	Price
GPM	LPM	Low-flow	High-flow		Catalog number	Catalog number	
0 to 1	0 to 4	0 to 0.8: ±0.008 LPM	0.8 to 4: ±1% of reading	¾"	<a href="#">TW-32504-00</a>	<a href="#">TW-32504-02</a>	
0 to 2	0 to 8	0 to 1.7: ±0.017 LPM	1.7 to 8: ±1% of reading	¾"	<a href="#">TW-32504-04</a>	<a href="#">TW-32504-06</a>	
0 to 5.25	0 to 20	0 to 4.7: ±0.047 LPM	4.7 to 20: ±1% of reading	½"	<a href="#">TW-32504-08</a>	<a href="#">TW-32504-10</a>	
0 to 13	0 to 50	0 to 10.6: ±0.106 LPM	10.6 to 50: ±1% of reading	¾"	<a href="#">TW-32504-12</a>	<a href="#">TW-32504-14</a>	
0 to 21	0 to 80	0 to 18.8: ±0.188 LPM	18.8 to 80: ±1% of reading	1"	<a href="#">TW-32504-16</a>	<a href="#">TW-32504-18</a>	

**TW-32504-80 Extension cable;** flame-retardant PVC, 9½-ft (3-m) long with connector cover

**TW-32504-81 Extension cable;** flame-retardant FEP, 9½-ft (3-m) long with connector cover

**TW-32504-82 USB to RS-485/RS-422 adapter** for computer communications

**TW-32504-83 D-sub connector with open-end cable** for PLC communications





# Flowmeters

## Ultrasonic

### Portable Doppler Flowmeters

**Ideal for measuring flow rates of dirty or particulate ridden fluids—sensor does not contact the fluid so there is no contamination**

- Programmable models 05613-60 and -65 display velocity in ft/sec, m/sec; flow rate in GPM, cu ft/sec, GPD, MGPD, and L/sec

Monitor flow rates of slurries and dirty fluids that can foul in-line sensors. These flowmeters are convenient to use both in the plant and in the field. Simply clamp or hold the sensor onto the outside of your pipe†—no specialized installation fittings needed. Dual-hinged sensor automatically aligns itself, ensuring proper placement for measurement. An LED indicator lets you know if there is a sufficient amount of reflective material in the liquid to monitor velocity. Adjustable velocity calibration control ensures accurate readings.

**Standard Models** measure fluid velocity or flow rate for pipe sizes from 1" to 30" ID. Models 05613-10, -15, -20, and -25 have a switch-selectable display in either ft/sec or m/sec. Select models 05613-30 or -35 to read in ft/sec or GPM. Order models with 4 to 20 mA output to connect to a recorder or data logger for keeping a permanent record.

**Programmable Model** provides fluid velocity and flow rate for pipe sizes from 1" to 30" ID. Units feature a 16-character display for viewing velocity in ft/sec or m/sec; flow rate in GPM, cubic ft/sec, GPD, MGPD, or L/sec; and accumulated flow to seven digits in gallons or liters. Programmable model also features a 4 to 20 mA output, a digital filter for data smoothing, and an adjustable response time of 0 to 99 seconds.

All models are battery operated—simply use the included charger/power supply to recharge battery for use up to four hours. All models except 05613-10, -15, -30, and -35 also operate on 115 or 220 VAC power for long-term monitoring using the charger/power supply.

**What's included:** sensor with 1-meter long cable, battery charger/power supply, couplant, and nylon carrying case with shoulder strap.

†Not recommended for use with transit (clay), cast iron, concrete, or fiberglass pipes.

#### TECHNICAL info!

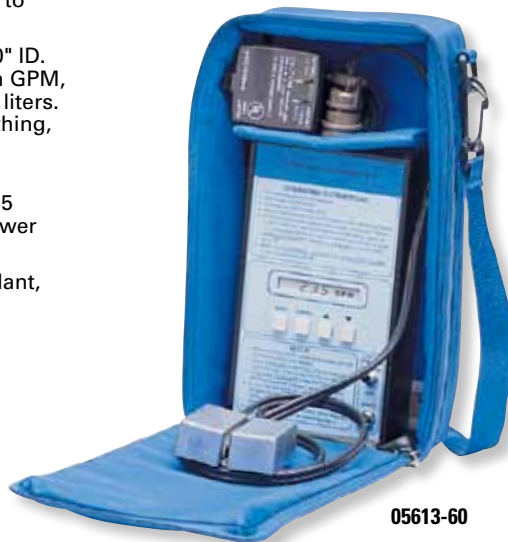
Convert velocity into flow units:

$$GPM = 2.45 \times (ID \text{ in inches})^2 \times (\text{velocity in ft/sec})$$

$$L/sec = 0.08 \times (ID \text{ in cm})^2 \times (\text{velocity in m/sec})$$



05613-30



05613-60

#### Specifications

**Fluid type:** fluids with particulates or bubbles; 100 ppm, 100 µm or larger

**Accuracy:** ±2.0 LSD

**Repeatability:** ±0.2% full-scale

#### Operating temperature

Models 05613-10 through -35:

Meter: -13 to 185°F (-35 to 85°C)

Sensor: -40 to 240°F (-40 to 115°C)

Models 05613-60 and -65: 23 to 158°F (-5 to 70°C)

**Display:** 3½-digit LCD, ½"H (1.3 cm)

**Dimensions (W x H x D):** 7¼" x 4⅛" x 2" (18.4 x 10.4 x 5.1 cm)



Velocity rates	Resolution	Totalizer	Output	115 VAC, 60 Hz models		220 VAC, 50 Hz models	
				Catalog number	Price	Catalog number	Price
<b>Standard models</b>							
0.5 to 20 ft/sec; 0.3 to 6 m/sec	0.1 ft/sec; 0.1 m/sec	No	None	<a href="#">TW-05613-10<sup>††</sup></a>		<a href="#">TW-05613-15<sup>††</sup></a>	
0.5 to 20 ft/sec; 0.3 to 6 m/sec	0.1 ft/sec; 0.1 m/sec	No	4 to 20 mA	<a href="#">TW-05613-20<sup>††</sup></a>		<a href="#">TW-05613-25<sup>††</sup></a>	
0.5 to 20 ft/sec <sup>‡</sup>	0.1 ft/sec; 1 GPM	No	None	<a href="#">TW-05613-30</a>		<a href="#">TW-05613-35</a>	
<b>Programmable model</b>							
0.5 to 20 ft/sec; 0.3 to 6 m/sec <sup>‡</sup>	0.1 ft/sec; 0.1 m/sec; 1 L/sec; 1 cu ft/sec; 1GPM; 1 GPD; 1 MGPD	Yes	4 to 20 mA	<a href="#">TW-05613-60</a>		<a href="#">TW-05613-65</a>	

<sup>‡</sup>Meters also read flow rates. To figure out the maximum flow rate the meter can read, use the equation in the "Technical information" box (above).

<sup>††</sup>Battery operation only. Use charger/power supply to recharge battery.

**TW-03277-70 Analog signal-to-RS-232 converter** for collection and analysis of data on a PC. Includes software, a bidirectional A/D and D/A signal conditioner with switch for 0 to 5 VDC or 4 to 20 mA input, and 110 V, power supply; use screw terminal connections

**TW-05612-60 Replacement transducer couplant** for all models; use for increased sensitivity

#### MORE info!

Benefits of using a nonintrusive Doppler flowmeter include reduced material costs, low maintenance costs, reduced installation time, and reduced or no downtime for your process. Since the transducers clamp on to existing piping, they can be used in any existing process. These meters are designed for applications such as water/wastewater, carbonated liquids in the beverage industry, mining slurry, paper and pulp processing, and dredging, where the accurate measurement of liquids is required.



## Single-Channel Universal Flow Transmitters

Add-on modules help you create your own customized transmitter

- Large, backlit LCD with "dial-type" digital bar graph
- Customizable label and bar graph settings

**NEW**

Versatile transmitters feature a large LCD with digital bar graph as well as the main and secondary measurements. Preset values offer quick and easy programming. Or, customize your unit for labeling, min/max dial settings, and unit/decimal measurement options. Both panel- and field-mount models run on 12 to 32 VDC power and can be looped with compatible sensors.

Order add-on modules to create the ideal control center. The relay module 56560-15 (for panel-mount transmitter only) features two programmable dry-contact relays for hysteresis and time delay. PC COMM module 56560-19 lets you easily configure your transmitter from your computer—save settings and use for future installations. Choose the H COMM module 56560-17 to communicate with any HART®-enabled device and remotely adjust 4 to 20 mA settings. Expand your measurement capabilities using the optional parameter modules for applications including flow, pressure, and level control. Contact our Application Specialists for details.

**What's included:** panel-mount transmitter includes mounting bracket and panel gasket.

### REQUIRED SYSTEM Components

- 1 Transmitter
- 2 Add-on modules
- 3 Accessories



56560-12

### Specifications

- Accuracy:** ±0.5% of reading  
**Operating temperature:** 14 to 158°F (–10 to 70°C)  
**Input signal:** 0.5 to 1500 Hz  
**Output**  
 Relay: optional, two SPDT relays  
 Current: one 4 to 20 mA, isolated, fully adjustable and reversible  
 Open collector: optically isolated, 50 mA max  
**Housing:** NEMA 4X (IP65) front panel  
**Display:** 7- and 14-segmented LCD, backlit  
**Dimensions (W x H x D):** 3¼" x 3¾" x 2½" (9.9 x 9.9 x 5.5 cm)  
**Power:** 12 to 32 VDC, ±10%

Key	Catalog number	Description	Price
1	TW-56560-12	Transmitter, panel mount	
	TW-56560-14	Transmitter, field mount†	

†Field-mount model requires angle adjustment adapter kit 56560-26.



### 2 Add-On Modules

- TW-56560-15 Relay module,** two dry contact relays for panel-mount only  
**TW-56560-19 PC COMM communication tool** allows one or many 9900 devices to be configured  
**TW-56560-17 H COMM module,** imposes HART digital signal on top of 4 to 20 mA analog

### 3 Accessories

- TW-56560-26 Angle adjustment adapter kit,** required for field mount  
**TW-05631-50 Universal mount kit,** for field mount  
**TW-93310-50 Integral mount kit,** ¾" in for field mount  
**TW-56560-24 Wall mount accessory kit** for both models  
**TW-56560-21 In-line connector kit,** optional for both models  
**TW-19007-52 RC filter kit,** for relay use. Kit of 2  
**TW-17101-63 NIST-traceable calibration** with data

## Batch Controller

- Dual relays provide external control of pumps, valves, or alarms
- Remote start/stop/resume capabilities let you control system from your computer

User-selectable menu provides easy configuration of current and relay options. Use the 4 to 20 mA output signal to send data to a recorder or data acquisition system, or to proportionally control a valve. Relays provide a simple on/off control of alarms, pumps, or valves. Pulse output lets you start, stop, or resume controller from your computer.

Front panel features a reversible analog dial (0 to 100% or 100 to 0%); a microprocessor based alphanumeric LCD; and four-button keypad. Controller even features a backlit LCD for reading display in dimly lit areas. Security code access sequence protects your programmed settings from tampering; nonvolatile memory saves data in case of power failure.

Controller operates on 12 to 24 VDC/VAC—order AC power supply 26900-10 separately. Controller is compatible with all flow sensors on page 647. Unit includes mounting brackets, panel gaskets, and a self-adhesive template for easy mounting; see below for additional mounting options.



05628-00

### Specifications

- Accuracy:** ±0.5% of reading  
**Operating temp:** 14 to 131°F (–10 to 55°C)  
**Input signal:** 0.5 to 1000 Hz, optically isolated  
**Relays:** two SPDT; 125 VAC or 30 VDC, 5 A max; resistive

Catalog number	Description	Price
TW-05628-00	Batch controller	

- Output signal**  
 Current: 4 to 20 mA, nonisolated  
 EOB pulse: remote start, stop, resume  
**Power:** 12 to 24 VDC/VAC, 50/60 Hz

- Display:** analog dial (0 to 100% or 100 to 0%); 2-line, 16-character alphanumeric LCD (0 to 999,999 batch size)  
**Dimensions (W x H x D):** 3½" x 3½" x 3½" (8.9 x 8.9 x 8.9 cm)



- TW-17101-63 NIST-traceable calibration** with data  
**TW-05629-50 NEMA 4X (IP65) rear cover kit;** includes knock-out ports for cable access  
**TW-05629-60 Surface-mount kit** for flat surface or pipe mounting; use with the NEMA 4X (IP56) rear cover kit 05629-50  
**TW-05629-55 Liquid-tight connector kit.** Includes three watertight connectors to run sensor and/or controller wires to and from the NEMA 4X rear cover kit



# Flowmeters

## Magnetic

### Low-Flow Magnetic Flowmeter

#### Unaffected by fluid density and fluid viscosity changes

- No moving parts
- Requires no straight pipe
- Chemical- and corrosion-resistant PVDF material

With no moving parts, this low-flow magmeter handles fluids containing particulate matter without clogging or jamming, keeping maintenance at a minimum. Accuracy is maintained with conductive fluids (>20 mS) of varying viscosities and densities. Flowmeter has no metallic parts and features a 100% PVDF body and PVDF carbon fiber-filled electrodes. The meter is corrosion resistant and compatible with a wide range of chemicals.

The meter is compact enough to fit most pump/injection systems. With zero straight pipe required after an elbow, it can be easily mounted in tight spaces. Mounting brackets are included and add stability for installation.

Meter comes with FlareTek™ fittings. For NPT connections, order separate fitting adapters (at right) which are required for installation. **Note:** Two fittings are required for each flowmeter.

#### REQUIRED SYSTEM Components

- 1 Flowmeter
- 2 Fittings



33111-51

#### Specifications

**Minimum fluid conductivity:** 20 µS/cm

**Accuracy:** ±1% full-scale

**Max fluid temperature:** 32 to 200°F (0 to 93°C)

**Operating pressure:** 150 psi (10.3 bar)

**Wetted materials:** PVDF

**Power:** 10 to 15 VDC

**Output:** 4 to 20 mA and pulse

**Electrical connection:** 18-ft (6-m) 8-pin M12 plug

**Fitting size:** 3/4" FlareTek

**Dimensions (L x W x H):** 3 1/2" x 2 3/4" x 4" (8.9 x 7 x 10.2 cm)



#### 2 Fittings (required)

**TW-33111-91 PVC adapter FlareTek to NPT(M)** for magmeter, 3/4" x 3/4"

**TW-33111-92 PVDF adapter FlareTek to NPT(M)** for magmeter, 3/4" x 3/4"

**TW-33111-93 PVC adapter FlareTek to NPT(M)** for magmeter, 3/4" x 1/2"

**TW-33111-94 PVDF adapter FlareTek to NPT(M)** for magmeter, 3/4" x 1/2"

#### Accessories

**TW-33111-89 O-ring, EPDM,** for adapters

**TW-33111-90 O-ring, Viton®,** for adapters

**TW-33111-95 Power and output cable**

#### 1 Flowmeters

Catalog number	Flow range		Price
	GPM	LPM	
<a href="#">TW-33111-51</a>	0.2 to 20	0.75 to 76	

### Electromagnetic Flow Sensors

#### Easy installation in difficult applications

- Use with 1", 1 1/2", and 2" piping

Insertion electromagnetic flow sensors are designed for use with conductive liquids in pipe. They are highly suitable for difficult applications with changing viscosities and pulsating flows such as air-driven diaphragm pumps, and can be used in "dirty" applications where debris would foul a mechanical meter. These flowmeters have no moving parts, are economical, durable, and very easy to install and maintain.

Applications include measurement and control of conductive fluids, measurement for data reporting in industrial processes, control of chemical metering pumps, and fertigation (fertilization feed). A choice of materials—PVC, brass, and 316 stainless steel (SS)—allows the meter to adapt to a wide range of temperature, pressure, and corrosive environments. These flowmeters have a current-sinking pulse output that can be combined with the appropriate transmitter or indicator for the application.

Fittings are required to ensure correct depth placement in the pipe. For fittings, go online to ColeParmer.com and type in 33112-61 in the search field. 1" fittings must be special ordered. Contact an Application Specialist.



33126-12

#### Specifications

**Flow range:** 0.2 to 20 ft/sec

**Fluid type:** conductive liquids

**Min fluid conductivity:** 20 µS/cm

**Accuracy:** ±1% full-scale

**Operating temperature**

PVC: 32 to 130°F (0 to 55°C)  
Brass and SS: 32 to 200°F (0 to 93°C)

**Max operating pressure**

PVC: 150 psi (10.3 bar)  
Brass and SS: 200 psi (13.8 bar)

**Wetted materials**

Body: PVC, brass, or SS  
Electrodes: Hastelloy  
Electrode cap: PVDF  
O-ring: EPDM  
Housing: aluminum

**Power:** 12 to 24 VDC

**Output:** square wave pulse, 550 Hz @ 20 ft/sec

**Enclosure rating:** IP65

**Cable length:** 18 ft (5.5 m)



Pipe size	PVC sensor body		Brass sensor body		316 SS sensor body	
	Catalog number	Price	Catalog number	Price	Catalog number	Price
1"	<a href="#">TW-33126-00</a>		<a href="#">TW-33126-06</a>		<a href="#">TW-33126-12</a>	
1 1/2"	<a href="#">TW-33126-02</a>		<a href="#">TW-33126-08</a>		<a href="#">TW-33126-14</a>	
2"	<a href="#">TW-33126-04</a>		<a href="#">TW-33126-10</a>		<a href="#">TW-33126-16</a>	

**TW-33112-52 Batch controller**, provides batch control via two relay outputs

\*For specifications on these controllers, see page 649.

**TW-33110-60 Flow controller**\*, provides flow control via 4 to 20 mA output, panel mount

**TW-33110-70 Flow controller**\*, provides flow control via 4 to 20 mA output, wall mount



## Insertion Magmeter Flowmeters

### Accurate measurement even in dirty liquids

- Bidirectional flow
- No moving parts
- No pressure drop

These magmeters are insertion-style magnetic flow sensors that feature no moving parts. The sensor design provides long-term reliability with minimal maintenance. Typical applications include flow monitoring and control in chemical processing, water and wastewater management, pool and spa monitoring, irrigation control, and water distribution. Use together with the Signet installation fittings for automatic sensor alignment and insertion depth. Choose from flow monitors and controllers on page 657 for various installation options.

These versatile, simple-to-install sensors deliver accurate flow measurement over a wide dynamic range in pipe sizes from ½" to 8", satisfying the requirements of many diverse applications. Magmeters offer a choice of outputs—frequency/digital (S3L) or 4 to 20 mA—available on sensors with or without display. The frequency or digital (S3L) sensor output can be used with an extensive line of flow displays, totalizers, and controllers (available on page 657), while the 4 to 20 mA output can be used for direct input to PLCs, chart recorders, etc. Both the digital (S3L) and 4 to 20 mA output sensor interface is available for long distance signal transmission of up to 1000 ft. An additional benefit is the empty pipe detection which features a zero flow output when the sensors are not completely wet. The frequency output is bidirectional while the 4 to 20 mA output can be set for uni- or bidirectional flow using the display or the RS-232 set-up tool which connects to PCs for programming capabilities.

Display models have two SPDT relays and one solid-state relay. They feature permanent and resettable total values which can be seen on the display. The display contains multiple languages—choose from English, Spanish, German, French, Italian, and Portuguese menu options.

### REQUIRED SYSTEM Components

- 1 Flowmeter
- 2 Fittings



68874-33  
with display

### Specifications

**Flow range:** 0.05 to 10 m/sec  
**Fluid conductivity:** minimum 20 µS/cm  
**Repeatability:** ±0.5% of reading  
**Linearity:** ±1% of reading plus 0.01 m/sec

**Operating temperature**  
 Ambient: 14 to 158°F (–10 to 70°C)  
 Media: 32 to 185°F (0 to 85°C)  
**Maximum operating pressure:** 150 psi at 77°F (10.3 bar at 25°C)

**Power**  
 Frequency out: 4.5 to 26.4 VDC, 15 mA max  
 Digital out: 4.5 to 6.5 VDC, 15 mA max  
 4 to 20 mA out: 21.6 to 26.4 VDC, 22.1 mA max  
**Display:** 2-line x 16-character LCD



### 1 Flowmeters

Pipe size	Wetted material	Output	Flowmeters without display		Flowmeters with display	
			Catalog number	Price	Catalog number	Price
½" to 4"	PP and 316L SS	Frequency or digital	<a href="#">TW-32486-49</a>		<a href="#">TW-68874-33</a>	
		4 to 20 mA	<a href="#">TW-32486-50</a>		<a href="#">TW-32486-51</a>	
5" to 8"	PP and 316L SS	Frequency or digital	<a href="#">TW-32486-52</a>		<a href="#">TW-68874-31</a>	
		4 to 20 mA	<a href="#">TW-32486-53</a>		<a href="#">TW-32486-54</a>	

### 2 Fittings

Catalog number	Pipe ID	Material	Fitting type	Price
<a href="#">TW-05619-61</a>	½"	Polypropylene	Tee	
<a href="#">TW-05620-21</a>		PVC 80		
<a href="#">TW-05620-41</a>		316 SS		
<a href="#">TW-05620-32</a>	¾"	CPVC 80	Tee	
<a href="#">TW-05620-72</a>		Copper		
<a href="#">TW-05620-42</a>		316 SS		
<a href="#">TW-32512-26</a>	1"	PVC 80	Tee	
<a href="#">TW-05620-33</a>		CPVC80		
<a href="#">TW-05620-24</a>	1¼"	PVC 80	Tee	
<a href="#">TW-05620-25</a>	1½"	PVC 80	Tee	
<a href="#">TW-05620-35</a>		CPVC 80		
<a href="#">TW-05620-45</a>		316 SS		
<a href="#">TW-05620-26</a>	2"	PVC 80	Tee	
<a href="#">TW-05620-56</a>		Galvanized iron (40)	Tee	
<a href="#">TW-05620-16</a>	3"	PVC 80	Saddle	
<a href="#">TW-05620-18</a>		Galvanized iron (80)	Saddle	
<a href="#">TW-05620-29</a>	4"	PVC 80	Tee	
<a href="#">TW-05620-19</a>		PVC 80	Saddle	
<a href="#">TW-05620-83</a>	6"	PVC 80	Saddle	



Polypropylene  
tee fitting 05619-61



PVC tee fitting  
05620-24



Saddle fitting  
05620-16

[TW-17080-12](#) NIST-traceable calibration with data



# Flowmeters

## Magnetic

### Magnetic Flowmeters

#### Advanced memory technology enables quick and reliable startup

- Accuracy of ±0.4% of measured value
- Intuitive navigation and configuration

Delivering accurate flow measurement in sectors as diverse as chemical, power, oil and gas, pulp and paper, and metals and mining, these magnetic flowmeters are the ultimate flow solution for any process application. These magmeters have an intelligent design, state-of-the-art technology, advanced features, and deliver reliable and accurate measuring values. Self-cleaning, double-sealed electrodes enhance reliability and performance.

Using a higher excitation frequency combined with advanced filtering, the meter improves measurement accuracy by reducing fluid and electrode noise, resulting in a better product quality and higher reliability. Flowmeters are designed for high-temperature use, and in combination with a reinforced PFA liner, provide improved vacuum stability and prevent potential liner deformation—making these magmeters a perfect fit for all hot-fluid applications. Industry-optimized linings of PFA ensure resistance to abrasion and chemicals. The flow sensor has an IP68 (NEMA 4X) rating.

Standard HART® protocol enables online modification and monitoring of parameters. The backlit, graphical display can be easily rotated 270° without the need for any tools. “Through-the-glass” control allows local operator interface to input short, quick data for all user-specific parameters. The user-friendly interface allows quick and simple data entry for all process parameters. With the soft-key functionality, the configuration is as simple as using a mobile phone.

Advanced data storage inside the sensor eliminates the need to match sensor and transmitter in the field. The on-board sensor memory eliminates the possible problems associated with pluggable data memory modules. On initial installation, the self-configuration sequence automatically replicates all data into the transmitter eliminating the opportunity for errors and leading to increased speed of startup. Redundant storage of data in both the sensor and the transmitter memory is continually updated during all operations to ensure total integrity of the measurement. Easy access to wiring also minimizes the time for problem solving in the field.

These magmeters feature diagnostic capabilities providing the right information to keep the process up and running. In accordance with NAMUR NE107, alarms and warnings are classified with the status classifications such as “maintenance required,” “function check,” “failure,” and “outside of specification”.

#### Specifications

- |  |   |
|--|---|
| <b>Fluid type:</b> liquids to slurries                                 | <b>Power:</b> 100 to 230 VAC, 60 Hz   |
| <b>Fluid conductivity:</b> >5 µS/cm (20 µS/cm for demineralized water) | <b>Power consumption:</b> ≤20 VA (flowmeter sensor including transmitter)   |
| <b>Accuracy:</b> ±0.4% of measured value                               | <b>Output:</b> 4 to 20 mA   |
| <b>Operating temperature:</b> 14 to 140°F (–10 to 60°C)                | <b>Electrical connection:</b> screw terminals; ½" NPT(F) conduits connector |
| <b>Medium temperature:</b> 14 to 266°F (–10 to 130°C)                  | <b>Process connection:</b> flange (ASME CL 150)                             |
| <b>Operating pressure:</b> –14.7 to 294 psi (–1 to 20.3 bar)           | <b>Enclosure rating:</b> IP68, NEMA 4X                                      |
| <b>Wetted materials:</b> PFA liner with stainless steel electrodes     | <b>Display type:</b> high-contrast LCD; 2-line, 8-character                 |
| <b>Process connection material:</b> stainless steel                    | <b>Serial communications:</b> HART  |

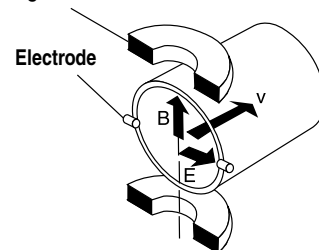


32813-10

#### Magnetic Flowmeters

There are two magnetic design styles: insertion and full-bore. Coils in the meter produce a magnetic field. When a conductive fluid is passed through the field, a voltage is produced through an electrode in the meter wall or insertion probe; this generated voltage is proportional to the flow. The technology offers no moving parts, and the full-bore designs offer no intrusions into the flow stream.

#### Magnetic coil



E = induced signal voltage  
B = magnetic flux density  
v = average flow velocity of fluid

Catalog number	Connection size	Flow range		Price
		GPM	LPM	
<a href="#">TW-32813-00</a>	½"	0.53 to 26.4	1 to 100	
<a href="#">TW-32813-02</a>	¾"	0.79 to 39.6	3 to 150	
<a href="#">TW-32813-04</a>	1"	1.06 to 52.8	4 to 200	
<a href="#">TW-32813-06</a>	1½"	3.17 to 159	12 to 600	
<a href="#">TW-32813-08</a>	2"	5.28 to 264	20 to 999	
<a href="#">TW-32813-10</a>	3"	15.9 to 739	60 to 2797	
<a href="#">TW-32813-12</a>	4"	21.1 to 1057	79.9 to 4001	

Applications	Water/wastewater, pulp and paper, mining, food and beverage, chemical
Advantages	No obstruction of flow path, no pressure drop, no moving parts, can handle heavy slurries
Disadvantages	Fluid must be conductive, must ground pipe

[TW-17080-12](#) NIST-traceable calibration with data

## Magnetic Flowmeters

Manufactured from FDA-approved materials and certified in accordance with EHEDG and 3A

- Accuracy to ±0.4% of measured value
- Intuitive navigation and configuration
- Designed specifically for the food and beverage, pharmaceutical, and biotechnology industries

This flowmeter is manufactured from FDA-approved materials and the sensor is fully CIP/SIP cleanable. Units feature high accuracy and advanced signal processing to ensure lowest cost of ownership. These magmeters provides a great deal of flexibility. The electrodes are embedded into the liner, ensuring a smooth surface without gaps or crevices. A reinforced PFA liner improves vacuum stability and prevents potential liner deformation.

While moisture ingress can cause drift and measurement inaccuracy or even product failure when using conventional magmeters in humid environments or areas with large temperature fluctuations, these magmeters' robust and rugged design is well-suited for these conditions. The fully encapsulated electronics reduce moisture ingress and enhance overall product reliability.

Using advanced filtering technology, these magmeters improve accuracy by separating the signal from the noise, resulting in better flow sensing reliability. The user-friendly interface allows quick and simple data entry for all process parameters. The "easy setup" guides the operator step by step through the menu to set parameters as fast as possible. Soft-key functionality makes configuration as simple as using a mobile phone.

Standard HART® protocol enables online modification and monitoring of parameters. The backlit, graphical display can be easily rotated through 270° without the need for any tools. "Through-the-glass" control allows local operator interface to input short, quick data for all user-specific parameters.

Advanced data storage inside the sensor eliminates the need to match sensor and transmitter in the field. The on-board sensor memory removes the potential problems associated with pluggable data memory modules. On initial installation, the self-configuration sequence automatically replicates all data into the transmitter, eliminating the opportunity for errors and leading to increased speed of start-up. Redundant storage of data in both the sensor and the transmitter memory is continually updated during all operations to ensure total integrity of the measurement. Easy access to wiring also minimizes the time for problem solving in the field.

The magmeter monitors its own operability and your process. In accordance with NAMUR NE107, alarms and warnings are classified with the status classifications such as "maintenance required," "function check," "failure," and "outside of specification".



32813-20

### Specifications

- Fluid type:** liquids to slurries
- Fluid conductivity:** >5 µS/cm (20 µS/cm for demineralized water)
- Accuracy:** ±0.4% of measured value
- Operating temperature:** -4 to 140°F (-20 to 60°C)
- Ambient temperature:** -13 to 356°F (-25 to 180°C)
- Operating pressure:** -14.7 to 232 psi (-1 to 16 bar)
- Wetted materials:** PFA
- Nonwetted materials:** carbon steel and aluminum
- Power:** 100 to 230 VAC, 60 Hz
- Power consumption:** ≤20 VA (flowmeter sensor incl. transmitter)
- Output:** 4 to 20 mA and HART
- Electrical connection:** screw terminals; ½" NPT(F) conduit connector
- Process connection:** sanitary Tri-Clamp®
- Enclosure rating:** NEMA 4X (IP68)
- Display type:** high-contrast LCD; 2-line, 8-character
- Serial communications:** HART



### Find MORE!

See our "Fittings" section on pages 509-575 for sanitary gaskets, clamps and fittings.



### Unique Products



Hard-to-find products you can't get anywhere else!

Cole-Parmer®  
Delivering Solutions You Trust

Catalog number	Connection size	Flow range		Price
		GPM	LPM	
<a href="#">TW-32813-14</a>	½"	0.53 to 26.4	1 to 100	
<a href="#">TW-32813-16</a>	¾"	0.79 to 39.6	3 to 150	
<a href="#">TW-32813-18</a>	1"	1.06 to 52.8	4 to 200	
<a href="#">TW-32813-20</a>	1½"	3.17 to 159	12 to 600	
<a href="#">TW-32813-22</a>	2"	5.28 to 264	20 to 999	
<a href="#">TW-32813-24</a>	3"	15.9 to 739	60 to 2797	
<a href="#">TW-32813-26</a>	4"	21.1 to 1057	79.9 to 4001	

[TW-17080-12](#) NIST-traceable calibration with data



# Flowmeters

## Vortex

### Heavy-Duty Process Vortex Flowmeters/ Transmitters

#### A rugged design for aggressive environments

- An alarm relay is standard with an additional option for temperature output

With no moving parts and a heavy-duty brass body, the device was designed to operate in aggressive environments. Meters are ideal for measuring process water, water-based machine coolant, or water/glycol coolants and can alert process operators of dangerous flow/temperature deviations.



Flowmeter 32997-32 with GPM display

Programming each unit is done through a simple array of buttons on the face of the unit. Through the 3-digit LED, you may select the display units (GPM or LPM), the relay-set point, and the relay function (normally open or normally closed). Rotate the display for easy viewing within any system arrangement.

Meters with temperature output include a second 4 to 20 mA signal scaled on the temperature range of the meter (35 to 210°F); an additional relay is also included. The unit offers the option to display temperature in addition to flow. Order multipin cables below to interface this device with a power supply and input/output controller/recorder.

#### Specifications

**Fluid type:** nonviscous water-like fluids

**Accuracy:** ±5% of full-scale

**Repeatability:** ±0.25% of full-scale

**Turndown ratio:** 10:1

**Operating temperature:** 35 to 210°F (0 to 97°C)

**Operating pressure:** 300 psi (20 bar)

**Wetted materials:** brass, Viton®, PVDF

**Input power:** 10 to 30 VDC @ 80 mA

#### Electrical connection

Flowmeter: 5-pin DC microconnector

Flowmeter w/temp transmitter: 8-pin DC microconnector

**Electrical classifications:** NEMA 4 (IP65)

**Display type:** 3-digit LED, 0.3" high

**Output signal(s):** 4 to 20 mA, flow or flow/temperature

**Relay type:** SPST solid state, NC or NO, 250 mA max†

†Relay output is 250 mA at/below 185°F for 1/4" and 1/2" units, 100 mA above 185°F. Output is 125 mA at/below 185°F for 3/4" to 2" units, 50 mA above 185°F.

#### Dimensions

Connections	Width	Height	Depth (face to pipe centerline)
1/4" and 1/2"	3.25"	2.74"	3.13"
3/4" and 1"	4.54"	4.19"	4.04"
1 1/2" and 2"	6.82"	4.19"	4.71"

Catalog number	Connection size NPT(F)	Flow range		Pressure drop (at max flow)	Price
		GPM	LPM		
<a href="#">TW-32997-30</a>	1/4"	0.4 to 4.0	1.5 to 15.1	8 psid	
<a href="#">TW-32997-32</a>	1/2"	1.2 to 12	4.7 to 45.4	4 psid	
<a href="#">TW-32997-34</a>	3/4"	2.5 to 25	9.5 to 94.6	4 psid	
<a href="#">TW-32997-36</a>	1"	5 to 50	18.9 to 189.2	9 psid	
<a href="#">TW-32997-38</a>	1 1/2"	10 to 100	37.9 to 378.5	5 psid	
<a href="#">TW-32997-40</a>	2"	20 to 200	75.7 to 757.1	5 psid	

[TW-32997-92](#) Five-pin power/signal cable for use with flowmeters, 3 m, pigtail end

[TW-32997-94](#) Eight-pin power/signal cable for use with flowmeters/temperature transmitters, 5 m, pigtail end

### Vortex Flowmeters for Liquids

Built-in 1000 Ω RTD sensor provides direct temperature measurement of media

- Rugged PPA molded construction
- Excellent media compatibility



32825-72

These economical vortex flowmeters are suitable for water and water/glycol-based heat exchange systems. The transmitters work on the vortex shedding flow principle. As flow velocity increases, alternating vortices are formed on each side of the bluff body within the flowtube and travel downstream. The flowmeters utilize piezoelectric sensors embedded in a vane downstream from the bluff to detect the vortices and transfer the sensed vortices into flow velocity. A flow factor is provided to convert frequency to volumetric flow rate for each size of flowmeter.

**Note:** Media with viscosity greater than 2 centipoise will require higher flow rates to form measurable vortices within the flowtube.

#### Specifications

**Fluid type:** low viscosity water-like fluids

#### Accuracy

Up to 50% flow: ≤1% of reading  
Over 50% flow: ≤2% of reading

#### Temperature measurement

Range: -40 to 302°F (-40 to 150°C)  
Accuracy: ±0.8°F at 68°F (±0.45°F at 20°C); ±1.4°F at 190°F (±0.75°C at 20°C)

**Operating temperature (ambient):** 5 to 185°F (-15 to 85°C)

**Operating pressure:** 261 psi (18 bar)

**Pressure drop at max flow:** 3 psid

#### Wetted materials

Sensor vane: ETFE  
Sealing material: EPDM  
Flow sensor and bluff: PPA

**Input power:** 5 VDC

**Electrical connection:** M12x1, 5-pole DC microconnector

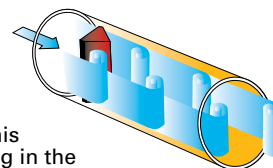
**Output:** 4 to 20 mA

Catalog number	Connection size NPT(F)	Flow range		Price
		GPM	LPM	
<a href="#">TW-32825-68</a>	1/4"	0.24 to 3.96	0.9 to 15	
<a href="#">TW-32825-70</a>	3/8"	0.48 to 8.45	1.8 to 32	
<a href="#">TW-32825-72</a>	1/2"	0.93 to 13.2	3.5 to 50	
<a href="#">TW-32825-74</a>	3/4"	1.32 to 22.5	5 to 85	
<a href="#">TW-32825-76</a>	1"	2.38 to 39.6	9 to 150	

### TECHNICAL info!

#### Vortex Flowmeterics

Using a pressure sensor, this meter measures the pressure pulses from vortices that come from the fluid passing a bluff body bar across the flow stream. A simple analogy of this phenomenon is that of a flag waving in the wind. The pulses are proportional to the rate of flow. Many users find the technology appealing because it has no moving parts. Because the meter body and vortex bar can be molded as one, this design is ideal for making meters for use in aggressive or high-purity applications.



Applications	Utilities, water and wastewater
Advantages	Low to medium initial setup costs, very low maintenance when used in clean flow conditions
Disadvantages	Low to medium pressure drop due to obstruction in flow path



Cole-Parmer Flow Switches

**A Compact Low-Flow Switches**



These normally open switches are specifically designed for reliable operation in clean air and water applications. Select from gas or liquid flow switches. Use a 50 µm filter to protect your switch. Switches include 18" (45.7 cm) L leads.

Specifications



**Switch:** SPST, NO, 20 VA  
**Max temperature:** 212°F (100°C)  
**Max pressure:** 150 psi at 70°F (10.3 bar at 21°C)  
**Wetted materials:** Noryl®, 316 SS, and epoxy  
**Connections:** 1/4" NPT(M)



Flow setting <sup>†</sup>	Catalog number	Price
<b>Gas switches</b>		
25 cfm/60 cfm	<a href="#">TW-32778-30</a>	
1 cfm/2.6 cfm	<a href="#">TW-32778-32</a>	
2.5 cfm/5.6 cfm	<a href="#">TW-32778-34</a>	
5 cfm/12 cfm	<a href="#">TW-32778-36</a>	
<b>Liquid switches</b>		
0.05 GPM	<a href="#">TW-32778-31</a>	
0.25 GPM	<a href="#">TW-32778-33</a>	
0.50 GPM	<a href="#">TW-32778-35</a>	
1.00 GPM	<a href="#">TW-32778-37</a>	

<sup>†</sup>Switch actuation set points are listed for 5 psi and 100 psi.

**D Liquid Flow Switches for Threaded Plastic Piping**



These normally open switches have 3/4" NPT(F) ports for a quick connection to threaded plastic piping. Polypropylene and stainless steel wetted parts offer excellent chemical resistance. The materials are also NSF and FDA approved for potable water treatment applications such as chlorinators, purifiers, and heaters. Switches include 24" (61.0 cm) L leads.

Specifications



**Switch:** SPST, NO, 20 VA  
**Max temperature:** 212°F (100°C)  
**Max pressure:** 100 psi at 70°F (6.9 bar at 21°C)  
**Wetted materials:** polypropylene, Viton®, 316 SS, and PH 15-7 Mo stainless steel  
**Connections:** 3/4" NPT(F)



Flow setting	Catalog number	Price
0.25 GPM	<a href="#">TW-32774-60</a>	
0.50 GPM	<a href="#">TW-32774-62</a>	
1.00 GPM	<a href="#">TW-32774-64</a>	
2.00 GPM	<a href="#">TW-32774-66</a>	
2.50 GPM	<a href="#">TW-32774-68</a>	
5.00 GPM	<a href="#">TW-32774-70</a>	

**B Low Pressure-Drop Liquid Flow Switches**



These SPST switches feature a unique, dual-diameter, internal bore and piston configuration to minimize flow constriction and provide low pressure drop. Use a 150 µm filter to protect your switch. Switches include 1/4" male quick connect terminals.

Specifications



**Switch:** SPST, 20 VA  
**Max temperature:** 212°F (100°C)  
**Max pressure:** 200 psi at 70°F (13.8 bar at 21°C)  
**Wetted materials:** PP, Ryton® PPS, Viton®, and 316 SS  
**Connections:** 1/2" NPT(M)



Flow setting	Catalog number	Price
<b>Normally open switches</b>		
0.5 GPM	<a href="#">TW-32776-00</a>	
1.0 GPM	<a href="#">TW-32776-01</a>	
2.0 GPM	<a href="#">TW-32776-02</a>	
3.0 GPM	<a href="#">TW-32776-03</a>	
4.0 GPM	<a href="#">TW-32776-04</a>	
5.0 GPM	<a href="#">TW-32776-05</a>	
<b>Normally closed switches</b>		
0.5 GPM	<a href="#">TW-32776-20</a>	
1.0 GPM	<a href="#">TW-32776-21</a>	
2.0 GPM	<a href="#">TW-32776-22</a>	
3.0 GPM	<a href="#">TW-32776-40</a>	
4.0 GPM	<a href="#">TW-32776-42</a>	
5.0 GPM	<a href="#">TW-32776-44</a>	

**E Liquid Flow Switches with 90° Ports**



No need to cut a straight pipe to install your flow switch. These switches with 90° ports easily fit where a pipe elbow would be installed. Available in SPST or SPDT models. Use a 50 µm filter to protect your switch. Switches include 24" (61.0 cm) L leads.

Specifications



**Switch:** SPST or SPDT, 20 VA  
**Max temperature:** 225°F (107°C)  
**Max pressure:** 250 psi at 70°F (17.2 bar at 21°C)  
**Wetted materials:** Ryton® PPS, Viton®, 316 SS, and epoxy  
**Connections:** 9/16-18 UNF



**C Liquid Flow Switches for Plastic Piping**



Use these normally open switches with plastic pipes without threads. Switches are available in gray or clear PVC housing. Use clear switches where visual flow confirmation is needed. Use a 150 µm filter to protect your switch. Switches include 24" (61.0 cm) L leads.

Specifications



**Switch:** SPST, NO, 20 VA  
**Max temperature:**  
 Clear switches: 120°F (50°C)  
 Gray switches: 140°F (60°C)  
**Max pressure:**  
 Clear switches: 120 psi at 70°F (8.3 bar at 21°C)  
 Gray switches: 150 psi at 70°F (10.3 bar at 21°C)  
**Wetted materials:** PVC, Buna N, and epoxy



Connections	Flow setting	Catalog number	Price
<b>Clear switches</b>			
1/2" NPT <sup>‡</sup>	0.5 GPM	<a href="#">TW-32777-00</a>	
3/4" IPS	0.5 GPM	<a href="#">TW-32777-02</a>	
1" IPS	2.0 GPM	<a href="#">TW-32777-03</a>	
<b>Gray switches</b>			
1/2" NPT <sup>‡</sup>	0.5 GPM	<a href="#">TW-32777-20</a>	
3/4" IPS	0.5 GPM	<a href="#">TW-32777-22</a>	
1" IPS	2.0 GPM	<a href="#">TW-32777-24</a>	

<sup>‡</sup>The 3/4" IPS model with 1/2" NPT port adapter installed.

Ordering Information for **E**

Flow setting	Catalog number	Price
<b>Normally open SPST switches</b>		
0.1 GPM	<a href="#">TW-32774-00</a>	
0.25 GPM	<a href="#">TW-32774-02</a>	
0.5 GPM	<a href="#">TW-32774-04</a>	
0.75 GPM	<a href="#">TW-32774-06</a>	
1.0 GPM	<a href="#">TW-32774-08</a>	
1.5 GPM	<a href="#">TW-32774-10</a>	
<b>SPDT switches</b>		
0.1 GPM	<a href="#">TW-32775-00</a>	
0.25 GPM	<a href="#">TW-32775-01</a>	

Adapters

**TW-32775-50 Adapter,**  
 9/16-18 UNF x 1/8" NPT(F)  
**TW-32775-51 Adapter,**  
 9/16-18 UNF x 1/4" NPT(F)  
**TW-32775-52 Adapter,**  
 9/16-18 UNF x 1/2" hose barb

See next page for more...





# Flowmeters Switches

## Adjustable Flow Switches for Liquids and Gases

### Liquid Flow Switches for High In-line Pressures



The one-piece magnetic PPS composite piston makes these normally open switches ideal for high pressure applications. Switches withstand up to 1500 psi at 70°F (21°C)! Use a 100 µm filter to protect your switch. Switches include 24 to 26"L leads.

#### Specifications

- Switch: SPST, NO, 20 VA
- Max temperature: 275°F (135°C)
- Max pressure: 1500 psi at 70°F (10.3 bar at 21°C)
- Wetted materials: brass or SS, PPS composite, 316 SS, and fluorocarbon
- Connections: 3/8" NPT(M)



Flow setting	Catalog number	Price
<b>Brass switches</b>		
0.25 GPM	<a href="#">TW-32774-30</a>	
0.50 GPM	<a href="#">TW-32774-32</a>	
1.00 GPM	<a href="#">TW-32774-34</a>	
1.50 GPM	<a href="#">TW-32774-36</a>	
2.00 GPM	<a href="#">TW-32774-38</a>	

Flow setting	Catalog number	Price
<b>Stainless steel switches</b>		
0.25 GPM	<a href="#">TW-32774-40</a>	
0.50 GPM	<a href="#">TW-32774-42</a>	
1.00 GPM	<a href="#">TW-32774-44</a>	
1.50 GPM	<a href="#">TW-32774-46</a>	
2.00 GPM	<a href="#">TW-32774-48</a>	

### UL-Approved Liquid Flow Switches for High In-Line Pressures



These high-pressure SPDT switches withstand pressures up to 1000 psi at 225°F (107°C)! They provide reliable and consistent performance; ±1% repeatability. Switches are UL-listed for use in Class I, Division 2, Groups A, B, C, D hazardous environments. Use a 50 µm filter to protect your switch. Switches include 24"L leads.

#### Specifications

- Switch: SPDT, 20 VA
- Operating temp: 225°F (107°C)
- Operating pressure: 1000 psi at 225°F (68.9 bar at 107°C)
- Wetted materials: brass, polysulfone, 316 SS, Viton®, and epoxy
- Connections: 1/4" NPT(F)



Flow setting	Catalog number	Price
0.10 GPM	<a href="#">TW-32778-06</a>	
0.25 GPM	<a href="#">TW-32778-08</a>	
0.50 GPM	<a href="#">TW-32778-10</a>	
0.75 GPM	<a href="#">TW-32778-12</a>	
1.00 GPM	<a href="#">TW-32778-14</a>	
1.50 GPM	<a href="#">TW-32778-16</a>	

### Adjustable set points trigger SPST contacts rated for 70 VA

- Brass models handle pressures up to 1500 psi

As liquid or gas flows past the switch, it displaces a magnetic piston—this actuates a hermetically sealed reed switch. All flow switches have actuation points for air at 68°F and 14.7 psi with increasing flow. Withstand temperatures from -40 to 220°F. UL-recognized.

**Mini Low-Flow Switches** are configured to open the SPST contact when flow goes beyond the set point or stops. Typical applications include gas/liquid sampling, chemical injection, pollution control monitoring, atmospheric furnaces, and process systems.

#### Specifications

- Repeatability: ±2%
- Wetted materials: Model 32929-00: brass, epoxy, and Viton®; Model 32929-02: TFE



Connections	Flow range		Max pressure psi (bar)	Material	Catalog number	Price
	Air (scc/min)	Water (cc/min)				
1/8" NPT(F)	30.0 to 16,000	1.0 to 500	1500 (103)	Brass	<a href="#">TW-32929-00</a>	
			80 (5.5)	TFE	<a href="#">TW-32929-02</a>	



**A** 32929-00

**Standard Low-Flow Switches** are normally closed (NC) but can be wired for normally open (NO). Typical applications include chemical process and vapor deposition systems, industrial gas lines, pollution control monitoring, and atmospheric furnaces.

#### Specifications

- Repeatability: ±2%
- Wetted materials: Models 32929-10 and -14: brass, epoxy, and Viton®; Models 32929-12 and -16: TFE



Connections	Flow range		Max pressure psi (bar)	Material	Catalog number	Price
	Air (scc/min)	Water (cc/min)				
1/8" NPT(F)	100 to 20,000	3.0 to 500	1500 (103.4)	Brass	<a href="#">TW-32929-10</a>	
			100 (6.9)	TFE	<a href="#">TW-32929-12</a>	
1/8" NPT(F)	200 to 60,000	5.0 to 950	1500 (103.4)	Brass	<a href="#">TW-32929-14</a>	
			100 (6.9)	TFE	<a href="#">TW-32929-16</a>	



**B** 32929-10

**Industrial Flow Switches** are normally closed (NC) but can be wired for normally open (NO). Typical applications include lubrication, process and fire control, cooling systems, heat pumps, hydraulic lifts, and water treatment.

#### Specifications

- Repeatability: ±2%
- Wetted materials: brass, epoxy, and Viton®
- Back pressure: 5 psi required for gas applications



Connections	Flow range		Max pressure psi (bar)	Material	Catalog number	Price
	Air (scfm)	Water (GPM)				
1/4" NPT(F)	0.5 to 50.0	0.1 to 4.0	1500 (103.4)	Brass	<a href="#">TW-32929-20</a>	
3/8" NPT(F)					<a href="#">TW-32929-22</a>	
1/2" NPT(F)	1.0 to 75.0	0.5 to 10.0			<a href="#">TW-32929-24</a>	
3/4" NPT(F)	5.0 to 120	1.0 to 20.0			<a href="#">TW-32929-26</a>	



**C** 32929-22